THE EVOLUTION OF SOCIAL AND ENVIRONMENTAL COMMUNICATION IN THE OIL & GAS SECTOR

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Abstract

Communication is the primary instrument used by companies to manage stakeholder attention, and achieve credibility, trust, and legitimacy (Freeman, 1984). There are different types of communication, and each plays its own role in the business system. The most common is financial communication, whose aim is to release quantitative and qualitative information concerning the income and the statement of financial position in order to reduce information asymmetries between companies and stakeholders (Akerlof, 1970).

However, in the course of time, the value of a company has been no longer a direct expression of its financial results alone but has been also assessed in relation to specific contexts, such as the social and environmental context. For this reason, there has been a growing interest in social and environmental communication, whose main function is to inform stakeholders about the company's operations in the areas where they operate. These are areas where actions in favour of social, political and environmental factors have a strong impact and where humanitarian organisations operate that could initiate actions against the same companies.

This happens with the oil & gas sector, which is a sector with a very strong environmental impact, as it is considered to be the primary cause of greenhouse gas pollution. Therefore, recently, investors have had strong doubts about the operation of these companies, as social and environmental litigation could have a negative effect on company value

and threaten investments made in them. These doubts were written down in a letter that the investment funds sent to the companies with the greatest impact on the environment (IIGCC, 2020).

In response, companies operating in this sector have reserved an important area for social and environmental issues within their strategy, driven by a considerable amount of information required by stakeholders.

Up to now, reporting has been voluntary, but there is a growing need to make social and environmental information standardized in order to increase comparability between them and their actual degree of accountability. In this regard, the EU is the first institution to start this process of transforming reporting from voluntary to mandatory with the "Single Market Act" (Commission of the European Communities, 2001).

This process starts with Directive 2014/95/UE and the stipulation of the Paris Agreements[1]. The Directive makes social and environmental reporting mandatory for companies that have a certain size and revenue capacity[2], while the Agreements give guidelines on how companies should behave with regard to pollution. Moreover, this process can still be described as ongoing, as *ad hoc* organization are being set up to create standards that uniformly guide companies in making social and environmental disclosures.

Based on this information we develop our hypotheses. Firstly, the shift from voluntary to mandatory reporting may have influenced the way in which companies make social and environmental disclosures. As a second step, we also hypothesize a process of endorsement between companies operating in the same sector. To do this, we have chosen to analyse four companies operating in the oil & gas sector that meet the requirements of the Directive, and we opted for Eni, Royal Dutch Shell, Total and British Petroleum.

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[1] The Paris Agreement is the first universal and legally binding agreement on climate change adopted at the Paris climate conference in December 2015, and the EU and its member states are parties to the agreement, which was formally ratified on October 5, 2016, entering into force in November of the same year.
The Paris Agreement bridges today's politics and climate neutrality by the end of the century.
The key elements that are part of this agreement are:
•*Mitigation, reduce emissions*: Governments have agreed to keep the average global temperature rise below 2°C from pre-industrial levels as a long-term goal, aim to limit the increase to 1.5°C, as this would reduce to an extent significant risks and impacts of climate change, to ensure that global emissions reach the maximum level as soon as possible while recognizing that developing countries will take longer and achieve rapid reductions thereafter according to the best available scientific knowledge, in order to achieve a balance between emissions and removals in the second half of the century.
•*Adjustment*: Governments have agreed to strengthen the ability of societies, to address the impacts of climate change and to provide developing countries with ongoing and more consistent international support for adaptation.
•*Transparency and examination of the situation worldwide*: Governments have agreed to meet every five years to assess collective progress towards long-term goals and inform parties to update and improve their nationally determined contributions, report to other member states and the public what they are doing to implement action for the climate and report the processes carried out towards the commitments undertaken with the agreement. Go through a solid system based on transparency and accountability.
•*Losses and damages*: The agreement recognizes the importance of avoiding, minimizing and addressing the loss and damage associated with the adverse effects of climate change and the need to cooperate and improve understanding, interventions and support in different fields, such as early warning systems, emergency preparedness and risk taking.
[2] Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014.

We have selected the annual reports from 2011 to 2019 of the companies taken into the analysis; and extracted the parts of interest to us[3] on the basis of a series of the key word (*greenhouse gas* which also groups the words *greenhouse gases*, *GHG* and *GHGs*; *climate change* which also contains the words *climate impact*; *environment* which contains the word *environmental*; *carbon footprint* which groups the words *carbon*, *CO2, carbon emission, decarbonization* and *global warming*).

Subsequently, with the analysis of these documents, we carried out a descriptive analysis both on the individual company, comparing the different years under analysis, and between companies. The descriptive analyses are divided as follows:

1. *Text size* — in this case, the logic of the construction was the following: we chose to build two graphs concerning the size of the text, one is based on the companies, while one uses the analyzed years. The abscissa axis concerns all the documents analyzed, ordered on a temporal basis and according to the companies. The bar graph allows us to understand how the size of the analysed documents (e.g., the set of words that have been extracted from each report) has grown over time. Furthermore, this information, which may seem obvious, is enriched by the segments shown in the graph. Each segment identifies an average, calculated on the basis of time: this means that for each year, based on the information in the report of the four companies, a single numerical value has been generated which summarizes the 'textual' trend of the reports.

2. *Frequency analysis* — in this section we want to give more detail to the words that are of particular interest. In this case, the analysis is developed along two different lines. Firstly, individual graphs are made for each company, which show the absolute and relative frequencies of the keywords within each report. Subsequently, analyzes are carried out by comparing the temporal evolution with the sample of companies analyzed. In this case, we also try to give the double interpretation both considering the trend on an annual basis and the development based on use in the reports of the individual companies. In the second analysis, seeing that the absolute and relative frequencies were similar, it was decided to consider only the second one. Unfortunately, the use of relative frequencies, even if more recommended, can cause problems in the context of textual analysis as being a text composed of many words, the denominator (i.e., the size of the text) leads to very low relative frequencies. To overcome the problem, let's try to give another interpretation to the relative frequencies with a further construction method. Rather than using the set of words of the whole report, we build the relative frequencies on the words of interest only. In this case, also the interpretation undergoes a clear change, as the amount over which the words are divided does not represent the total overall, but

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[3] This is because large companies usually release a report the contains all kinds of information, and we only need the parts that contain mainly social and environmental information.

the reference total of the words of interest. This technique is used in many environments and is legitimate if you remember the way it was built in the comment phase of the results. In a fairly simple way, we can say that the frequency obtained from this graph represents the percentage part (i.e., 100 the total) which is concentrated in a particular company in a given year[4].

3. *Network n-gram* — the graphs seen so far take into consideration the words as single elements, well isolated from each other. And with the network in n-gram[5] we try to give importance to the relationships between words by verifying how groupings are created. Usually, for the development of this type of analysis we proceed by analyzing the relationships between two words (which in this case are two unigrams) or between a group of words is a word (in this case it is a relationship between a bigram and a unigram), but in our specific case, the network presents both bigram and unigram with this method there is a network that concerns both pairs of words towards a word, both words towards other words. This type of network analyzes only the pairs of words of interest. Since our analysis projected both in time and in space, it was decided to carry out three different types of networks:

- *Network n-gram years*: This methodology allows to analyze the annual variations of the relationships of our keywords in a single graph. In fact, the graph will be formed by the word of interest placed in the center with all the relations present in the years 2011 and 2019, with a chromatic difference that will show which relations are present only in 2011, which are those present only in 2019 and, finally, which instead they are present in both years.

- *N-gram company network*: This methodology allows us to analyze the variations in the relationships of our keywords from a business perspective. Each graph concerns a single keyword that will be placed at the center of the network, with interactions with every single relationship present in the years 2011 and 2019 of each individual company. Also in this case there is a chromatic aid that differentiates the relationships, highlighting the word if it is found within the report of a specific company, or if it is found within more than one company (> 1).

- *Dimensional n-gram network*: This methodology, finally, allows us to analyze the repetitions of the relationships of our keywords. Each graph concerns a single company, and the thickness of the connecting line between the keywords and its relationship will be as thick as the number of times the relationship is repeated in the 2011 and 2019 reports.

4. *Analysis of the lexicon* — this last section deals with carrying out an analysis on the used lexicon and on the diversity both between

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[4] Because of the way the graphs is constructed, given that the total of a given word is set equal to 100, if the frequency obtained for the word climate change is 0.15 for British Petroleum (BP) in 2014, then we can commentas follows: 15% of the distribution of the bigram climate change falls in the yeat 2014 and is used in the BP report.

[5] An n-gram represents a sequence of text, in particolar we speak of unigram to refer to one word, bigram to reger to a pair of words, and so on.

the four companies and on the annual profile. From the theoretical point of view, a text can be examined in a fairly fluid way by some indicators, such as the tokens or the words present in the text, the types representing the 'unique' terms that appear in a document and finally the TTR index. That is the ratio between the number of unique terms and the total of words in the document. This index being expressed in percentage form allows obtaining some interesting information with respect to the analyzed texts. It should be noted that there are even more precise indices that try to eliminate the defects found in the case of using the TTR. A first criticism that can be made concerns the method of construction: Being a report, in which the denominator is given by the total number of words in the document, it is reasonable to expect low values when the size of the text is quite large. As for the interpretation of the results, it is easy to comment on the TTR index. Remember that the lower the value of the indexes, the greater the equal words in the text. Conversely, if the index assumes values close to unity, it means that the words of the text are more different. Consequently, high values imply that the text has a greater lexical richness.

From this data, we draw our conclusions. Recent changes, not only in legislation but also in the perception of these issues by stakeholders in the business environment, have led oil companies to adapt to this new understanding of social and environmental communication. Indeed, as they are subject to a high level of control of their environmental actions, they were communicating in a satisfactory way from a social and environmental perspective even before it became mandatory. So, noticing such a wide change within these contexts can give us an idea of the impact that regulations have had on the market in general. The descriptive analysis shows, in fact, a fully positive post-2015[6] trend, with the keywords analysed exponentially increasing their presence within the reports extracted for analysis. This indicates a distinct evolution on the part of companies in socio-environmental communication, which is beginning to have a strong relevance, often going to achieve entire chapters compared to pre-2015 years (in fact, when analyzing text size, after 2015 the number of words increases for almost all companies). The joint analysis of the four companies, on the other hand, runs counter to our predictions. In fact, we had hypothesized a path of homogenization of socio-environmental communication, due above all to the creation of standards to evaluate the benevolence of the data released. Instead, at least from a descriptive point of view, this homogeneity is not explicitly shown. This is because the process of creating new standards is still under development, and companies do not adhere to one body but choose for themselves which ones to use[7] since there is no formal rule.

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[6] Year in which the Directive and the Paris Agreements begin to take effect.
[7] There are many organizations that have issued standards for social and environmental reporting (Global Reporting Index standard, Task Force on Climate-Related Financial Disclosures, or the Climate Disclosure Standards Boards).

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