

# XXVI. International RESER Conference

## ***Sustainability Reports by Service Sector Companies in the decade of Climate Change.***

*José Aureliano Martín Segura<sup>1</sup>, César Pérez López<sup>2</sup>, José Luis Navarro Espigares<sup>3</sup>*

<sup>1,3</sup>University of Granada, <sup>2</sup>Complutense University of Madrid

### **1. Abstract**

*In this paper, we analyze the evolution of the main indicators of Sustainability Reports registered in the Global Reporting Initiative (GRI), particularly by companies from the sectors where the literature recognizes a greater possibility for green investments. Many companies belong to the service sector; Transport, Waste management, Water utilities, Education, Health, New Technologies related to Renewable Energy; and other sectors such as Agriculture, Construction, Energy or Infrastructure. Through descriptive and predictive statistical techniques, such as decision trees, we obtain evidence that the economic crisis has not had a negative effect on the development of sustainability reporting. Furthermore, we can confirm a steady increase in reports from companies in these sectors that are ever more transparent and of better quality.*

### **2. Introduction**

A formal definition of Corporate Social Responsibility (CSR) is the following: A set of obligations and commitments, legal and ethical, national and international, along with interest groups, arising from the impacts of the activities and operations of organisations, results in social, occupational, environmental and human rights. That is, CSR affects the very management of organisations, both in their productive and commercial activities, and in their relationships with interest groups (stakeholders). It influences all types of organisations, public or private or non-profit, in all their dimensions and performance as well.

Consequently, issues related to CSR would be **sustainable development**, management of **economic, environmental and social impacts** of business operations and underwriting **profitability**, not only for shareholders but also for other interested parties whom the company's activity affects.

A **triple goal** for businesses could be outlined as: to be economically viable, socially beneficial and environmentally responsible. That is, the objectives of sustainable development would be **environmental protection** (prevent and reduce environmental pollution and promote sustainable production and consumption), **cohesion and equality** (promoting a democratic society, cohesive, healthy, safe and just, that *respects fundamental rights* and cultural diversity), **economic prosperity** (development towards being prosperous, innovative, knowledge-rich, competitive and environmentally friendly), and **fulfil our international responsibilities** (to ensure that internal and external policies of the European Union are consistent with sustainable development).

Focusing on the aspect of **sustainable development**, The World Commission on Environment and Development, in its report "Our Common Future" known as the Brundtland Report, published in 1987<sup>1</sup>, coined the famous definition of **sustainable development** as "one that meets present needs without compromising the ability of future generations to meet their own needs".

The environmental impact of economic activity on our planet is manifested in various aspects. One of these, which has unfortunately been highlighted in recent years, concerns climate change. There are numerous references to climate change and strategies for its mitigation based on various sectoral actions for fighting together against environmental deterioration.

The adoption of the Paris agreement, in the Conference of the Parties Twenty-first session in Paris, 30 November to 11 December 2015, recognizes that climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions.

To achieve an accelerated reduction of global greenhouse gas emissions, important and controversial political decisions must be taken, and companies will also have to play a leading role. Apart from strategic decisions on their market positioning, companies need to take decisions regarding investments, systems of responsible and sustainable management and the extent of collaboration.

One of the most important initiatives for sustainability has been the **Global Reporting Initiative (GRI)**. The American Coalition for Environmentally Responsible Economies (CERES), along with the Programme of the United Nations for the Environment (UNEP), created this project. GRI began in 1997, published the first guide in 1999 and the final version in 2000 ([www.globalreporting.org](http://www.globalreporting.org)).

GRI is a process multistakeholder. It is an independent institution whose mission is to develop guidelines and disseminate globally applicable sustainability. These Guidelines are for voluntary use by an organization when preparing a report on the economic, environmental, and social dimensions of its activities, products, and services. It's the main international standard report for the development of CSR or sustainability.

<sup>1</sup> <http://www.un-documents.net/wced-ocf.htm>

The philosophy underlying this information tool is the triple account of results or Triple Bottom Line in its English terminology. This involves talking about sustainability.

In this work we have accessed the sustainability reports database published by the GRI from 1999 to 2015, and we analyze the main indicators contained therein.

### **3. Objectives**

Two main lines of action should be taken that we believe will be the keys to success in the strategy to combat climate change and environmental degradation. These are green investments and socially responsible policies in the business world. The literature supports that there are great opportunities for businesses in CSR and green investments, in areas such as Infrastructure investment required for sectors such as Agriculture, Transport and Water, Construction, Energy, Infrastructure, Waste Management, Water Utilities, Education, Health, and New Technologies related to Renewable Energy.

In this paper we analyze responsible management policies from different companies from all the sectors, but particularly from the sectors where the literature recognizes a greater possibility for green investments. This analysis will be undertaken utilising the main indicators of the sustainability reports registered by GRI.

Therefore, our main working hypothesis will be:

H1) Obtain evidence that the economic crisis has not had a negative effect on the development of sustainability reporting.

H2) Analyze the content of the main indicators of the sustainability reports of the database GRI, to verify fulfillment of the most important quality requirements, such as transparency, flexibility, comparability and participation of the stakeholders.

H3) Verify that in the sectors where the literature recognizes that there are greater possibilities for green investments as a result of climate change, an increase in the quantity and quality of sustainability reporting is occurring despite the economic crisis.

### **4. Methodology**

On the one hand we carry out a review of the literature analyzing the advantages and disadvantages of CSR and the benefits for businesses of implementing sustainable management.

On the other hand, we analyze the evolution of the main indicators of Sustainability Reports registered in GRI, in general on all the sectors, and particularly on the sectors companies in which the literature recognizes greater chance of green investments, to compare the relationship between the different indicators through descriptive statistical techniques, and some predictive, such as decision trees.

Decision trees are predictive models to solve problems of discrimination in a population segmented to finally obtain a reliable classification into homogeneous groups, according to the variable interest (Perez, 2016: 599).

They are predictive models because the segmentation of the population is made according to the values of the variable of interest, that playing the role of the dependent variable in the predictive model in the tree (qualitative variable). The assignment of a population to a segment element is performed according to the values of the independent variables of the model.

Therefore, what it is done is select the explanatory variables that are more discriminants for the dependent variable and construct a decision rule for allocating a new individual or class to a value of the dependent variable.

However, this method does not consider simultaneously the set of explanatory variables, because examines them one by one, looking first the  $x_j$  variable that best explains the dependent variable  $y$ . This would define a first division of the sample into two subsets called segments. After, the process it is repeat in each of the two segment, looking the second explanatory variable, and so on until the process ends with a previously established statistical norm.

In our case we will try to know what kind of indicators of sustainability reports have been more likely to be carried out by companies. The first selection could be done by company size. A second selection could be done because of the ranges of years of publication. A third of the region of the company. And finally in reason of sector. This technique is intended to apply to each of the main indicators that represent the highest quality in the preparation of the reports of sustainability. Prior to this, there will be conducted a descriptive analysis in which the evolution of the preparation of reports under the GRI methodology globally, for each of the main indicators contained in the GRI database is displayed.

## **5. Bibliographic review**

The growing attention to issues of sustainable consumption is a natural outcome of decades of work on cleaner production and ecoefficient industrial systems. It represents the final step in a progressive widening of the horizons of pollution prevention a widening which has gone from a focus on production processes, to products (eco-design to lower product impacts), then to product-systems (incorporating transport logistics, end-of-life collection and component reuse or materials recycling), and to ecoinnovation (new products and product-systems designed for win-win solutions for business and the environment) (UNEP, 2002).

Also from international organisations important recommendations have been published to promote sustainable development and help curb climate change (World Bank, 2010).

Meanwhile, the Human Development Report (UNDP, 2013) affects virtually the same issues as those highlighted by the World Bank. That is, it highlights the rise of the South, and what they call the "drivers" for more effective development: a developmental dynamic state, the ability to connect with global markets and the promotion of social inclusion and human development of large amplitude. That is to say, trade re-

lations between Southern countries are increasing, although the need for international cooperation to carry out all the policies is still needed, mainly in areas such as education, health and the environment, not to mention the great infrastructure investments. All of this represents a wealth of opportunities for innovative companies and for generating clean and sustainable technologies.

The Lalonde Report –A New Perspective on the Health of Canadians (Canadian Government, 1981)– pointed out the existence of the so-called counter-forces which constitute the dark side of economic progress. They include environmental pollution, city living, habits of indolence, the abuse of alcohol, tobacco and drugs, and eating patterns. The report emphasised that physicians, surgeons, nurses and hospitals together spend much of their time in treating ills caused by adverse environmental factors and behavioural risks. It confirmed that self-imposed risks and the environment are the principal or most important underlying factors in each of the five major causes of death between ages one and seventy. So, unless the environment is changed and the self-imposed risks are reduced, the death rates will not be significantly improved. It presented the first proofs and measures of the total effect of air pollution on health, establishing a direct cause-and-effect relationship between air pollution and sickness.

With Lalonde's Report, a new line of research was opened and it continues nowadays. Currently, the World Health Organisation (WHO) promotes a number of studies on the relationship between environment and health (N. Bruce et al., 2014).

Outdoor air pollution is a major environmental health problem affecting everyone in developed and developing countries alike. WHO estimates that some 80% of outdoor air pollution-related premature deaths were due to ischemic heart disease and strokes, while 14% of deaths were due to chronic obstructive pulmonary disease or acute lower respiratory infections; and 6% of deaths were due to lung cancer.

A 2013 assessment by WHO's International Agency for Research on Cancer (IARC) concluded that outdoor air pollution is carcinogenic to humans, with the particulate matter component of air pollution most closely associated with increased cancer incidence, especially cancer of the lungs. An association has also been observed between outdoor air pollution and increase in cancer of the urinary tract/bladder (Loomis et al., 2013).

The speed with which the increases in disease incidence have occurred in recent decades rules out genetic factors as the sole plausible explanation. Environmental and other non-genetic factors, including nutrition, age of mother, viral diseases and chemical exposures, are also at play, but are difficult to identify. Despite these difficulties, some associations have become apparent. Since human studies can show associations only, not cause and effect, it is important to use both human and animal data to develop the evidence for a link between exposures to endocrine disrupting chemicals (EDCs) and human disease. Even so, it may never be possible to be absolutely certain that a specific exposure causes a specific disease or dysfunction due to the complexity of both exposures and disease aetiology throughout the lifespan (WHO, 2013).

Most sources of outdoor air pollution are well beyond the control of individuals and demand action by cities, as well as national and international policymakers, in sectors like transport, energy waste management, construction, and agriculture.

In Martín, J.A., Pérez, C. and Navarro, J.L.(2016), it's analyzes the relationship among CO2 emission, mortality rate, and green investments, the later estimated by the volume of investment in R&D. Theirs estimates showed in both cases a positive and statistically significant relationship between CO2 emissions and these two variables, mortality and R&D investments.

Regarding the service sector, we believe that their contribution to climate change must be analysed through the transport subsector, because the growth of economic activity and the transport models (Alcántara, V. & Padilla, E., 2005) are two main factors behind the increase in CO2 emissions worldwide. Some studies estimate its contribution between 13 and 25% of total CO2 emissions in the world (Comisión de Transportes del Colegio de Ingenieros de Caminos, Canales y Puertos, 2010). These figures can be corroborated with the series offered by the World Bank<sup>2</sup>, which reports that emissions in 2010 reached 33,615 million Metric Tons of CO2, of which 5,811 were generated by the transport sector (including domestic aviation, road and rail transportation of people and products). These modes represented in 2010 over 17% of total emissions, excluding marine bunkers and international aviation. This questions It was analyzed by Martín J.A. and Navarro, J.L. (2014).

Regarding green investments, the IMF has provided a macroeconomic definition of green investment. A recent IMF Working Paper by Eyraud et al. (2011) refers to green investment as “the investment necessary to reduce greenhouse gas and air pollutant emissions, without significantly reducing the production and consumption of non-energy goods”. It covers both public and private investment. There are three main components of green investment. These are low emission energy supply (including renewable energy, bio fuels and nuclear), energy efficiency (in energy supply and energy consuming sectors), and carbon capture and sequestration (including deforestation and agriculture).

Dramatic upgrades in technology, skills, policies and business models, along with an aligned public consciousness, are needed for the transition to a green growth pathway. Infrastructure investment required for sectors such as agriculture, transport, water and power under current growth projections stands at about US\$ 5 trillion per year to 2020 (The World Economic Forum-WEF, 2013). Additional investment needed to meet the climate challenge—for clean energy infrastructure, sustainable transport, energy efficiency and forestry—is about US\$ 0.7 trillion per year.

Another interesting approach is based on knowledge of the opinion of companies regarding the implementation of sustainable management strategies in times of crisis like the present. As a result of the financial circumstances, many companies have been forced to curtail their spending, including that related to Corporate Social Responsibility (CSR), since it generates more costs (Fernández-Feijóo Souto, B., 2009; Orlitzky, Schmidt, & Rynes, 2003). Others firms think that some CSR initiatives could be delayed or cancelled due to the financial crisis (Njoroje, J., 2009). However, at the same time, the global financial crisis also provides wide opportunities for responsible companies in terms of brand reputation, employee satisfaction, economic efficiency and improved productivity.

<sup>2</sup> <http://datos.bancomundial.org/indicador/EN.CO2.TRAN.MT>

Although social initiatives represent an additional financial cost, in times of crisis, we recommend the implementation of CSR in seven areas of consensus: innovation, workplace environment, stakeholder participation, business strategy, market orientation, investor confidence and internal revision (Fernández-Feijóo Souto, B., 2009; Porter, M. E. & Kramer, M. R., 2002).

Karaibrahimoglu (2010) investigated the performance of CSR in the period 2007 (before the financial crisis) and 2008 (the beginning of the crisis in the American market) from the perspective of stakeholders. The study used a sample of 100 firms randomly selected from the "Fortune 500" ranking. The performance analysis was done by means of a content analysis of non-financial annual reports. The results show a decrease in CSR projects due to the financial crisis. This decrease is greater in the U.S. than in Europe.

However, Giannarakis and Theotokas (2011), using a transformation in the levels of implementation of the GRI for evaluating the responsible performance of 112 companies in 2007-2010, obtained an increase in the performance of the responsible companies before and during the financial crisis, except for the period 2009-2010.

The results of the work of Jacob (2012) show that the financial crisis of 2008 had a clear impact on CSR initiatives in many companies, due to the exceptional pressure that companies had to face to survive; with massive layoffs and cuts in spending on community involvement programs. However, not all the impacts of the crisis were negative. Some areas related to CSR were boosted and were reinforced after the crisis, such as corporate governance, environmental policies and compensation policies. The companies gave more importance to issues related to interest groups that they perceived as the most influential. Therefore, a subject such as environmental policies constituted a risk if the "green investors" were to decide to withdraw their support.

Jacob shows that social risks affecting the business reputation are explicitly presented in the annual reports with direct reference to environmental and human rights issues. The supply chain management and the risks associated with compliance with codes of business conduct are also highlighted in these reports. The importance of social risks and their impact on the reputation of companies is usually made explicit in internal reports, but not in published annual reports on CSR practices.

From the consideration of CSR practices in a context of strategic positioning of companies, Fernandez-Feijoo (2009) combines the concepts of CSR and crisis, concluding that, in times of crisis, CSR can go from being considered a threat to becoming an opportunity. The idea is that the economic crisis accentuates certain business needs that can be solved by the implementation process of CSR. Such needs include innovation, the work environment, the role of stakeholders, business strategy, market orientation, investor confidence and a deep inner revision.

The implementation of responsible practices requires an innovation process that is the key to achieving long-term survival of the company, which is perfectly compatible in periods of crisis. At the same time, CSR provides a desirable work environment where motivation and corporate culture permit facing periods of crisis. CSR creates an alliance with stakeholders that reorients the perceived risk of these crisis periods to the company. From the point of view of business strategy, CSR reinforces the process. CSR strengthens transparency and communication of the company, allowing it

to fortify its market position. Transparency and communication prevent distrust of investors, something critical in times of crisis.

In short, the development of CSR implementation processes in businesses compel an internal revision of identity, modes of operation, and attitudes towards responsible values in times of crisis, with the guarantee of their survival. However, we can find various business reactions; some opt to strengthen responsible practices as a strategy to combat the crisis; and others, on the contrary, seek to reduce the costs associated with CSR in the short-term to meet the challenges imposed by the financial crisis (Yelkikalan, N. & Köse, C., 2012).

What this crisis has clearly shown is that CSR is a phenomenon that is here to stay. This is not a fad or a temporary trend. CSR is increasingly linked to the business strategy of strengthening businesses in the long run. The partnership strategy with stakeholders provides a distinctive character to traditional competitive strategies. We cannot expect CSR to be the only solution for crisis; neither can the adjustment processes on employment or wages be avoided. However, it is important to evaluate its cumulative positive effects on relationships with other social and economic agents, as well as in relation to the protection and preservation of the environment.

Focusing on the content of sustainability reports prepared by the GRI methodology, the analysis has three areas: GRI Index and profile, GRI Principles and GRI Indicators (GRI, 2002-2015).

In the first two, GRI Index and profile and GRI Principles, we evaluate the quality of information provided on CSR management systems in the enterprise. In the final GRI Indicators, we evaluate the quality of content in terms of CSR provided in the documents examined.

The Global Reporting Initiative indicators are:

Economic performance: Customers, suppliers, etc.

Environmental performance: Raw materials, energy, water, biodiversity, etc.

Social performance - labour practices.

Social performance - human rights.

Social performance – society.

Social performance - product liability.

The Global Reporting Initiative principles are: Transparency, Inclusiveness, Auditability, Completeness, Relevance, Sustainability Context, Accuracy, Neutrality, Comparability, Quality and Periodicity.

There's a old debate, even today, regarding the requirement that companies generate mandatorily sustainability reports. The results of the second global survey on attitudes of stakeholders to the information CSR (Pleon, 2005), shows that more than 60% of the sample believed it would be good that CSR was incorporated into the annual financial reports, among other reasons for this would imply recognition of the importance of social and environmental aspects for the company, and forcing to report on these aspects to companies that otherwise would not.



For a sustainability report to be useful to all potential users, the information you collect must meet the requirements of relevance, reliability and verifiability. It is also important that the information collected is relevant in social and environmental terms and accessible to potential readers.

The importance of the sustainability report GRI is that it's an international voluntary standard, which provides information on the economic, environmental and social dimensions of their activities. In its development, the most demanding level is the "A +", which rests on transparency and third party verification, in order to balance flexibility in developing and achieving greater comparability among informants. All these requirements are those positively valued the different stakeholders in the Pleon 2005 survey. In this survey 65% felt it was a step towards standardization in order to provide comparability, in addition to its flexibility (57.8%) and the possibility of use as a benchmarking tool (49%).

## 6. Results

### 6.1. The main indicators of Sustainability Reports registered in GRI.

The main indicators contained in the database GRI sustainability reports are:

**ExternalAssurance:** All of the information related data points below is taken from the available assurance statement found in the Report.

**LevelofAssurance:** (is the complementary information)

1. Limited/ moderate
2. Reasonable/ high
3. Combination: Both a Limited/ moderate and Reasonable/ high level were applied to (different parts of) the report
4. Not specified

**Integrated:** Indicates whether or not the report includes both non-financial and financial disclosures, beyond basic economic information. Organizations self-declare whether or not their report is integrated.

**StakeholderPanelExpertOpinion:** Indicates whether there was formalized input to or feedback on the report provided by a panel of stakeholders or expert(s).

Within these indicators, there are references to other international standards, whose compliance by companies complements and reinforces rather broadly management sustainability. These standards are the following:

**Codes of Conduct for Multinational Enterprises OECD (OECD, 2011).** They are a set of voluntary principles and standards for companies adopted by adhering government, which is expected to multinational companies adhere.

The intent of these rules is to ensure that the activities of the Empre-sas are in harmony with government policies, strengthen the con-bond mutual between enterprises

and the societies in which they operate, improve the climate for foreign investment and the contribution to enhance the sustainable development.

Among its main principles and basic commitments, is included contributing to sustainable development, respect human rights of those affected by their activities, encourage local capacity, promote the training of local human capital, refrain from seeking or accepting exemptions not covered by the legal framework of the country, to support and uphold good corporate governance principles and best practices, promote employee awareness of company policies and compliance with them, refrain from discriminatory or disciplinary action against employees who make good faith, management reports or audits, encourage business partners to apply principles of corporate conduct compatible with the Guidelines and refrain from any improper involvement in local political activities..

**Code of Conduct Global Compact United Nations (UNGC).** The Global Compact of the United Nations or Global Compact is an initiative of ethical commitment, free secondment by companies, civil and labor organizations aimed at integration into the strategy and operations of the signatories, ten principles related to Human Rights Labor, Environment and Combat Corrupción. On the origins was an initiative of UN Secretary General Kofi Annan during the World Economic Forum in Davos in January 1999.

**Management System Certification SA8000.** It is a voluntary standard that specifies a number of criteria associated with the concept of social responsibility of the companies in its aspect of working conditions. It was developed by a group of experts in 1997, convened by the Council on Economic Priorities Accreditation Agency, CEPAA. By Social Accountability International (SAI) is being directed from 1998.

Its various clauses are based on the Universal Declaration of Human Rights, the UN Convention on the Rights of the Child, and in a series of Conventions and Recommendations of the International Labour Organization (ILO).

This rule is related to issues such as child labor, forced labor, Health and Safety at Work, Freedom of Association and Collective Bargaining, Discrimination, Discipline, Working Hours and Compensation.

As a complement to the above, the Standard SA8000 states that the company must take to turn a social management system (SMS) based on ISO 9000 and ISO 14000 standards, which revolve around questions as defined policies by the management of the company, appointment of representatives of the company for compliance with the standard, planned-cation and application of the rule, control of suppliers and subcontractors, external communications and record keeping.

**Generation Tool, Audit and Information Assurance Standard AA1000.** It is a tool developed by the Institute of Social and Ethical Accountability in 1999, as a model of continuous improvement, which aims to help improve and strengthen accountability and sustainability of organizations, through engagement with stakeholders. It is a system designed for internal and external audits, being a supplement to the GRI guidelines.

It is based on the fundamental principle of inclusivity of aspirations and needs of the participants in all stages of the process, to identify and understand the social, economic and environmental impact of the organization, the commitment to consider and

respond to the aspirations of stakeholders and the commitment to communicate their decisions, actions and impacts to these stakeholders.

## 6.2. Descriptive analyzes of the main indicators of Sustainability Reports registered in GRI.

In Table 1 we present the sustainability reports of the database GRI sector and years of publication, that we have divided into different ranges, in order to clearly visualize the effects before and during to the current financial crisis. As can be seen from this table, and also by the Figure 1 accompanying, the highest percentages of growth in sustainability reports is produced from 2013, doubling all previous periods, in almost all sectors, although in general, the increase was evident, despite the aforementioned crisis. The GRI database, contains 32,183 reports spread over 38 sectors, along 16 years, in the five continents of the world.

In Table 2 and corresponding Figure 2, this division is made by regions, with the largest production of sustainability reports in Europe (38.4%), followed by Asia, Latin America and the Caribbean, North America, Oceania and Africa .

In all the cases a significant increase was observed in production of sustainability reports in the middle years of the current financial crisis.

Two graphics (1 and 2), in which is show the evolution of the publication of the memoirs, in PDF format, or HTML. Although not an indication of quality of memory, the mere fact that they are published indicates that companies assume a commitment to transparency, because if any faulty or false information is discovered, it could mean a loss of prestige if the fact is published on social networks. As can be seen, these publications have increased during the years of the financial crisis, as happened with the preparation of sustainability reports in general, which could indicate that the companies have used such publications as synonymous with quality.

## 6.3. Predictive analyzes of the main indicators of Sustainability Reports registered in GRI, through the statistical technique of decision trees.

In the first group of decision trees it is used as the dependent variable External Assurance, in which all of the information related data points is taken from the available assurance statement found in the Report. As independent variables we use the variables: region, sector and ranges (publication period) (Tree 1).

The probability that sustainability reports have been elaborated with external validation of its content is 27.9%. The regions are the best predictor of this rate, with 40% for Latin America & the Caribbean and Asia (28.5% guaranteed memory); 40.5% for Europe and Oceania (33.4% guaranteed memory) and 19.4% for Northern America and Africa (15.4 guaranteed memory).

Descending level in the tree by region, for node 1 in the region Latin America & Caribbean and Asia, 29.5% is done with these quality criteria, and over 50% were made from the middle years of the financial crisis 2011-2012.

In the case of the second node, Europe and Oceania, the best predictor is only the sector without the influence of the processing period. The most important sector is Healthcare Products, Automotive and others (29% with 31% of reports with guarantees); Healthcare Services, Construction, Aviation, Waste Management (3.2% with 36.6% of guaranteed memory); Forest and Paper Product, Energy, Water utilities and Railroad (4.3% with 43.1% of reports guaranteed memory).

In the third node, North America and Africa, highlights the sector Automotive, Aviation and others, with 15% of reporting (15.7% guaranteed memory).

When used as independent variables other international indicators (Tree 2), the best predictor of that 27.9% that are made with external guarantee, is the SAE3000 and AA1000AS indicator for the memory group who choose the first indicator, complementing with the UNGC, based on the UN Global Compact.

In the second group of decision trees (tree 3 and 4), Integrated is used as an independent variable, that Indicates whether or not the report includes non-financial and both financial disclosures, beyond basic economic information. Organizations self-declare whether or not Their report is integrated. The independent variables are the same.

In this case the percentage of sustainability reports with financial information included, amounts to 14%, and also the regions are the most important predictors of this rate. The percentages of importance (with percentage of reports with financial information in parentheses) are: 14.3% Latin America & the Caribbean (10.2%); 37.4% Europe (14.8%); 12.9% Northern America (4%); 24.4% Asia (5.2%); 4.1% Oceania (17.5%). Here they are established the years of publication memory as the next most important predictor, mainly in the central periods of financial crisis. Finally the sectors, highlighting all but Automotive, Utilities and Energy are the best predictor in Latin America & Caribbean; Railroad, Universities, Healthcare products, Forest and Paper Products, Energy, Construction, Aviation and Waste Management in Europe; Tourisme Leisure, Healthcare Products in Asia; and Automotive, Railroad and other traditional sectors in Africa.

If we now use as independent variables international indicators, we find that ISO and OECD are doing the best predictions, and within OECD, the reference to ISO.

In the third group of decision trees (Tree 5 and 6), Stakeholder Expert Review Panel Information is the variable used as an independent variable. The results show that the proportion of reports with this warranty is 7.7%. The next most important predictor are the regions, which include a first group in Latin America & the Caribbean, Europe and Northern America, with 63% (7,1 Stakeholder Panel); Asia with 20.4% (11.3% Stakeholder Panel) and Oceania and Africa, with 10% (2% Stakeholder panel).

The sectors are the following predictors, but only for the first regional group, highlighting the group of Tourism sectors, Automotive, Universities, Aviation, Agriculture and Railroad (48.2 %), followed by the group of Energy Utilities, Healthcare Services, Healthcare Products , Forest, Water Utilities, Construction and Waste Management (10%).

If we refer to international indicators, in these memories the main predictor is AA1000AS, followed by ISO and OECD.

## 7. Conclusions

Through the bibliographical analysis, we have accessed important studies by different specialists, and reports from international organizations, which confirmed that the increased attention to environmental issues is the result of decades of work and the promotion of sustainable development by international organizations such as the United Nations (UN) or the World Bank.

It can also be confirmed that climate change and economic development are causing major health problems in the population. In fact, some studies show that emissions of greenhouse gases into the atmosphere are causing a significant increase in mortality in the world, and that many of these changes are already having a greater effect in the more developed societies and countries. This could be considered a "boomerang effect" of uncontrolled economic development.

All this has led international organizations to promote what is called "green investments", which are those needed to reduce greenhouse gases, without reducing the production and consumption of non energy goods. In this global shift towards sustainability some sectors are better suited to this type of investment than others. These sectors are Agriculture, Transport, Water, Energy and Forestry, where increasing annual investments of more than \$ 5 billion a year are planned until 2020.

Sustainable management criteria of CSR is something that is starting to become consolidated in business, despite the economic crisis. This is confirmed by some of the studies that we have accessed. This implies that these forms of management are reflected in the Sustainability Reports, which also helps to improve the image of businesses. Despite the economic crisis, there has been a clear increase in the number of sustainability reports made and published. This is indicated by the studies reviewed, but is also confirmed by the GRI data with which we worked. This data consists of 32,183 reports spread over 38 sectors, over 16 years from all five continents. There has been a steady increase in reports since 2000, and an increase and a concentration of more than 50% since 2013. These are good indicators. This would confirm the first hypothesis of our work (H1), and a part of the second (H2), as the increase in reports and verification by external agents is an important step towards transparency and comparability of reports.

We analyzed three main quality indicators contained in the GRI reports: External Assurance, Integrate and Stakeholder Integrated Information Expert Review Panel, which we have treated as variables of interest (dependent) in our predictive models. These variables assure us that reports are reviewed by independent third parties, or that they include relevant financial information above and beyond that normally required, or that a panel of experts has analyzed the activities of the company. All these variables have been placed in relation to other independent variables, such as the sector, the year of reporting, region or international quality indicators.

The results show that only 27.9% of the reports that are produced are audited by external agents, 14% have significant economic information incorporated and only 7.7%

have a Stakeholder Expert panel. This would indicate that we have not yet developed sustainability reports with proven and tested quality in all parts, which makes us doubt the complete fulfillment of the second hypothesis (H2). However, the mere fact that they are published indicates that companies assume a commitment to transparency, because if any faulty or false information is discovered, it could mean a loss of prestige if the event is published on social networks.

Regarding the regions, more sustainability reports clearly occur in Europe (38.4%), followed by Asia (25.5%), Latin American and the Caribbean (12.9%), North America (12.5%), Africa (6.5 %) and Oceania (4.1%). However, when we look at the percentages of sustainability reports made to guarantee external validation, the order of the regions changes somewhat. In this case we find Europe (40.5%), Latin America and Caribbean (40%), Oceania (33.4%) , Asia (28.5%), Northern America (19.4%) and Africa (15.4%).

In respect of the sectors, including those where, according to the literature analyzed, greater green and sustainable investments are being made, many sustainability reports come from the service sector. The evolution of these reports follows the same general behavior pattern described above. The majority of sustainability reports come from the Energy, Construction and Healthcare sectors, together with those related to Transport. We can therefore confirm our third hypothesis (H3).

## 8. Tables and figures

**Table 1 Sustainability Reports by all the Sectors**

		Ranges				Total
		until 2007	2008-2010	2011-2012	since 2013	
Agriculture	Count	23	60	83	172	338
	% within Sector_q	6,8%	17,8%	24,6%	50,9%	100,0%
Automotive	Count	88	114	181	348	731
	% within Sector_q	12,0%	15,6%	24,8%	47,6%	100,0%
Aviation	Count	52	97	137	254	540
	% within Sector_q	9,6%	18,0%	25,4%	47,0%	100,0%
Chemicals	Count	108	210	297	528	1143
	% within Sector_q	9,4%	18,4%	26,0%	46,2%	100,0%
Commercial Services	Count	47	121	170	326	664
	% within Sector_q	7,1%	18,2%	25,6%	49,1%	100,0%
Computers	Count	25	60	76	171	332
	% within Sector_q	7,5%	18,1%	22,9%	51,5%	100,0%
Conglomerates	Count	86	194	227	411	918
	% within Sector_q	9,4%	21,1%	24,7%	44,8%	100,0%
Construction	Count	83	199	274	462	1018

	% within Sector_q	8,2%	19,5%	26,9%	45,4%	100,0%
Construction Materials	Count	79	121	198	371	769
	% within Sector_q	10,3%	15,7%	25,7%	48,2%	100,0%
Consumer Durables	Count	39	73	83	133	328
	% within Sector_q	11,9%	22,3%	25,3%	40,5%	100,0%
Energy	Count	210	425	529	1018	2182
	% within Sector_q	9,6%	19,5%	24,2%	46,7%	100,0%
Energy Utilities	Count	193	360	374	620	1547
	% within Sector_q	12,5%	23,3%	24,2%	40,1%	100,0%
Equipment	Count	83	152	202	381	818
	% within Sector_q	10,1%	18,6%	24,7%	46,6%	100,0%
Financial Services	Count	384	751	977	1913	4025
	% within Sector_q	9,5%	18,7%	24,3%	47,5%	100,0%
Food and Beverage Products	Count	155	341	510	920	1926
	% within Sector_q	8,0%	17,7%	26,5%	47,8%	100,0%
Forest and Paper Products	Count	78	106	138	214	536
	% within Sector_q	14,6%	19,8%	25,7%	39,9%	100,0%
Healthcare Products	Count	80	137	188	352	757
	% within Sector_q	10,6%	18,1%	24,8%	46,5%	100,0%
Healthcare Services	Count	12	35	96	219	362
	% within Sector_q	3,3%	9,7%	26,5%	60,5%	100,0%
Household and Personal Products	Count	73	73	97	185	428
	% within Sector_q	17,1%	17,1%	22,7%	43,2%	100,0%
Logistics	Count	40	137	180	332	689
	% within Sector_q	5,8%	19,9%	26,1%	48,2%	100,0%
Media	Count	28	68	104	192	392
	% within Sector_q	7,1%	17,3%	26,5%	49,0%	100,0%
Metals Products	Count	66	132	186	328	712
	% within Sector_q	9,3%	18,5%	26,1%	46,1%	100,0%
Mining	Count	136	268	376	573	1353
	% within Sector_q	10,1%	19,8%	27,8%	42,4%	100,0%
Non-Profit/ Services	Count	35	144	193	363	735
	% within Sector_q	4,8%	19,6%	26,3%	49,4%	100,0%
Other	Count	157	421	699	1228	2505
	% within Sector_q	6,3%	16,8%	27,9%	49,0%	100,0%
Public Agency	Count	33	118	141	242	534
	% within Sector_q	6,2%	22,1%	26,4%	45,3%	100,0%
Railroad	Count	19	40	52	117	228
	% within Sector_q	8,3%	17,5%	22,8%	51,3%	100,0%

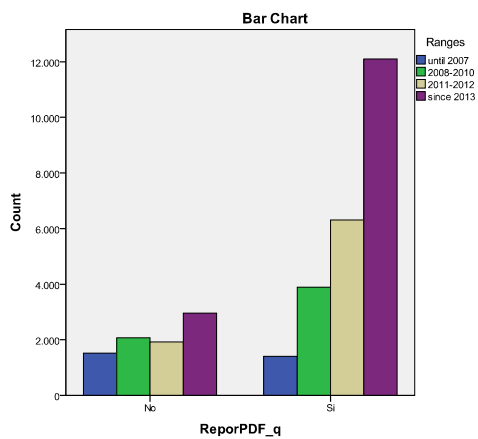
Real Estate	Count	23	124	257	501	905
	% within Sector_q	2,5%	13,7%	28,4%	55,4%	100,0%
Technology Hardware	Count	96	164	225	426	911
	% within Sector_q	10,5%	18,0%	24,7%	46,8%	100,0%
Telecommunications	Count	140	224	266	443	1073
	% within Sector_q	13,0%	20,9%	24,8%	41,3%	100,0%
Textiles and Apparel	Count	18	57	104	194	373
	% within Sector_q	4,8%	15,3%	27,9%	52,0%	100,0%
Tobacco	Count	42	22	14	25	103
	% within Sector_q	40,8%	21,4%	13,6%	24,3%	100,0%
Tourism/ Leisure	Count	15	69	135	273	492
	% within Sector_q	3,0%	14,0%	27,4%	55,5%	100,0%
Toys	Count	0	5	8	7	20
	% within Sector_q	,0%	25,0%	40,0%	35,0%	100,0%
Universities	Count	9	30	77	113	229
	% within Sector_q	3,9%	13,1%	33,6%	49,3%	100,0%
Waste Management	Count	20	43	65	141	269
	% within Sector_q	7,4%	16,0%	24,2%	52,4%	100,0%
Water Utilities	Count	48	85	100	175	408
	% within Sector_q	11,8%	20,8%	24,5%	42,9%	100,0%
Retailers	Count	100	180	220	390	890
	% within Sector_q	11,2%	20,2%	24,7%	43,8%	100,0%
Total	Count	2923	5960	8239	15061	32183
	% within Sector_q	9,1%	18,5%	25,6%	46,8%	100,0%

**Table 2 Sustainability Reports by Region**

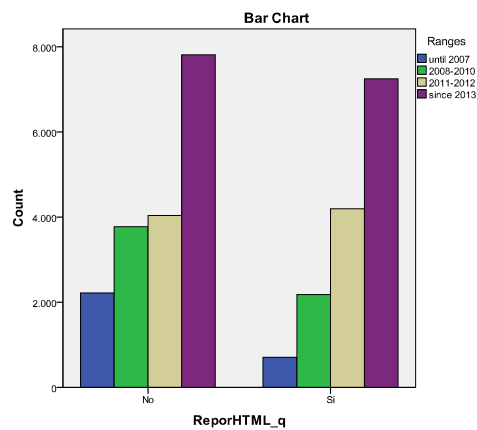
		Ranges				Total
		until 2007	2008-2010	2011-2012	since 2013	
Asia	Count	596	1550	2084	3974	8204
	% within Region_q	7,3%	18,9%	25,4%	48,4%	100,0%
	% within Ranges	20,4%	26,0%	25,3%	26,4%	25,5%
Europe	Count	1354	2434	3012	5548	12348
	% within Region_q	11,0%	19,7%	24,4%	44,9%	100,0%
	% within Ranges	46,3%	40,8%	36,6%	36,8%	38,4%
Latin America & the Caribbean	Count	233	769	1013	2135	4150
	% within Region_q	5,6%	18,5%	24,4%	51,4%	100,0%
	% within Ranges	8,0%	12,9%	12,3%	14,2%	12,9%
Northern America	Count	418	677	1066	1893	4054



	% within Region_q	10,3%	16,7%	26,3%	46,7%	100,0%
	% within Ranges	14,3%	11,4%	12,9%	12,6%	12,6%
Africa	Count	146	239	732	978	2095
	% within Region_q	7,0%	11,4%	34,9%	46,7%	100,0%
	% within Ranges	5,0%	4,0%	8,9%	6,5%	6,5%
Oceania	Count	176	291	332	533	1332
	% within Region_q	13,2%	21,8%	24,9%	40,0%	100,0%
	% within Ranges	6,0%	4,9%	4,0%	3,5%	4,1%
Total	Count	2923	5960	8239	15061	32183
	% within Region_q	9,1%	18,5%	25,6%	46,8%	100,0%
	% within Ranges	100,0%	100,0%	100,0%	100,0%	100,0%

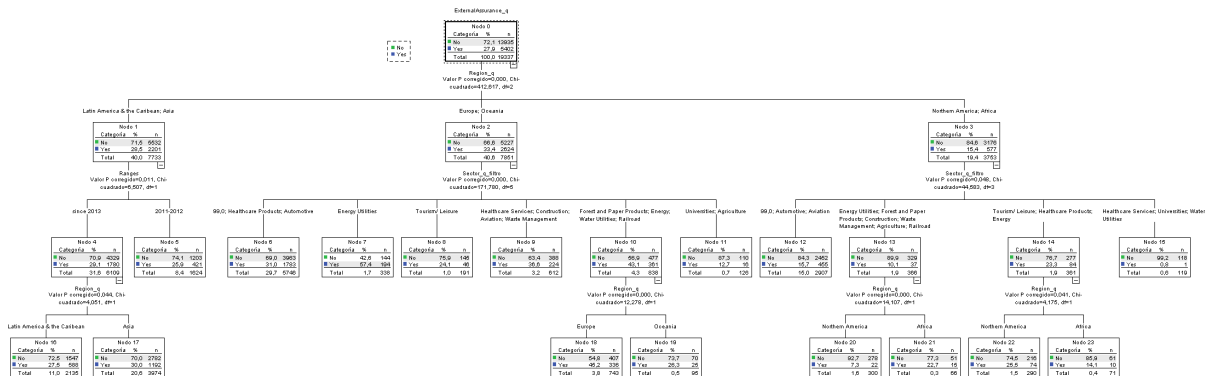


Grap 1 Sustainability ReportsPDF

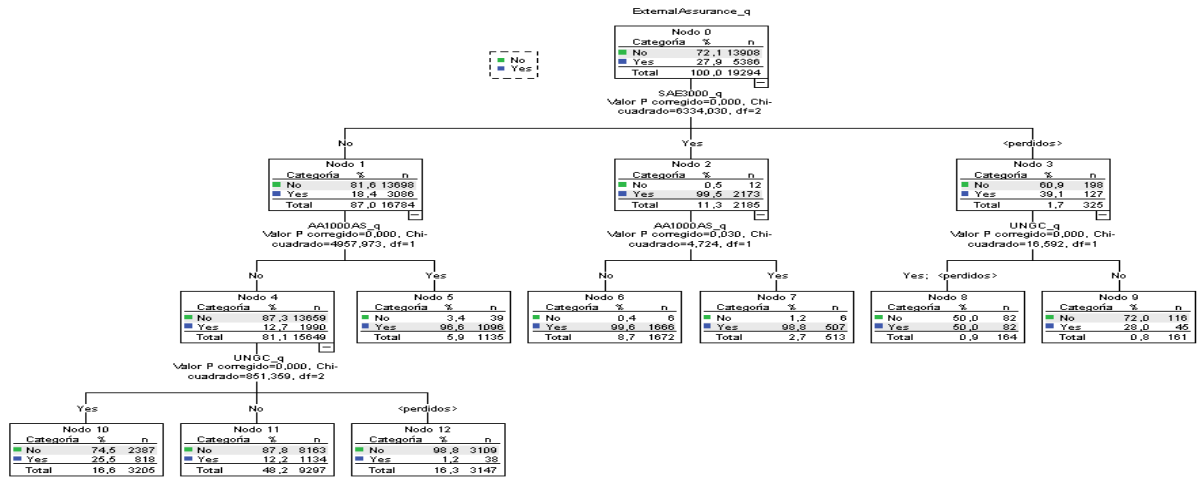


Grap 2 Sustainability ReportsHTML

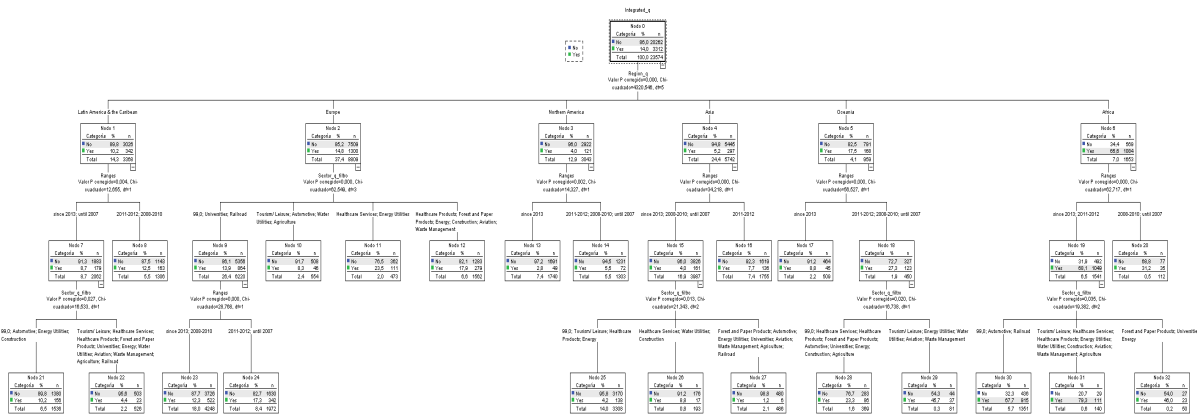
Tree 1 Sustainability Reports with External Assurance, by region and years



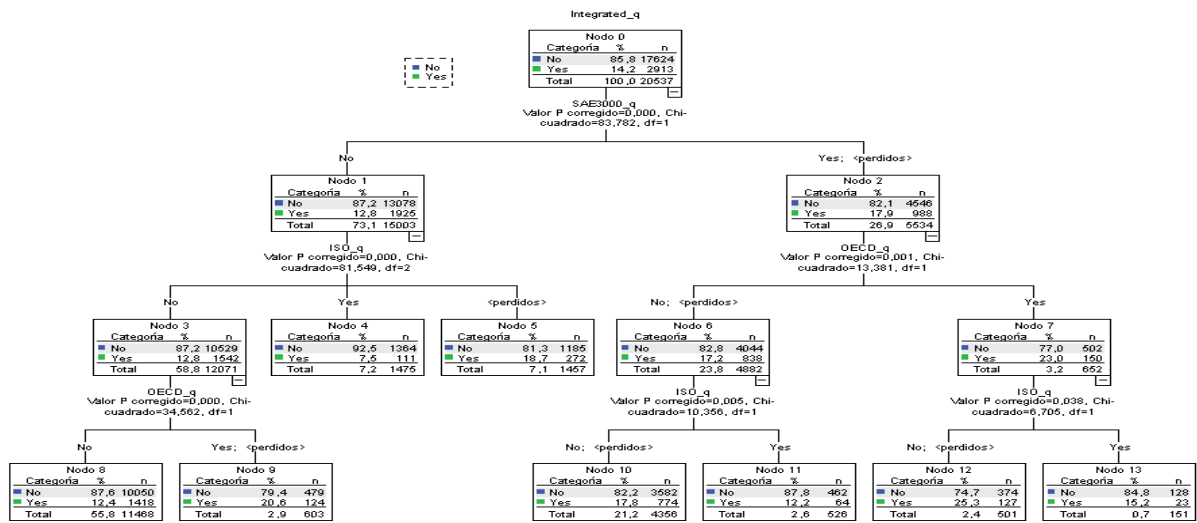
## Tree 2 Sustainability Reports with External Assurance, with other international indicators



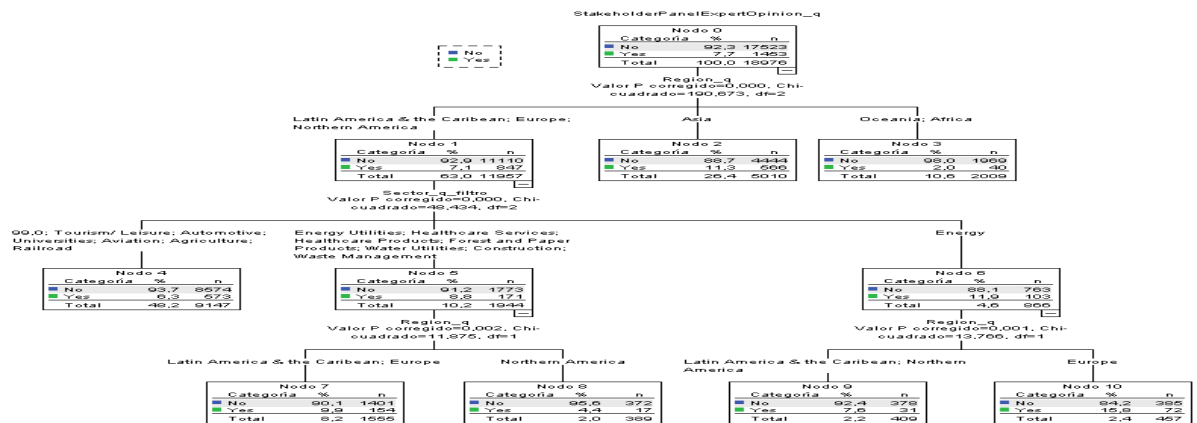
## Tree 3 Sustainability Reports with integrated economic information, by region, sectors and years.



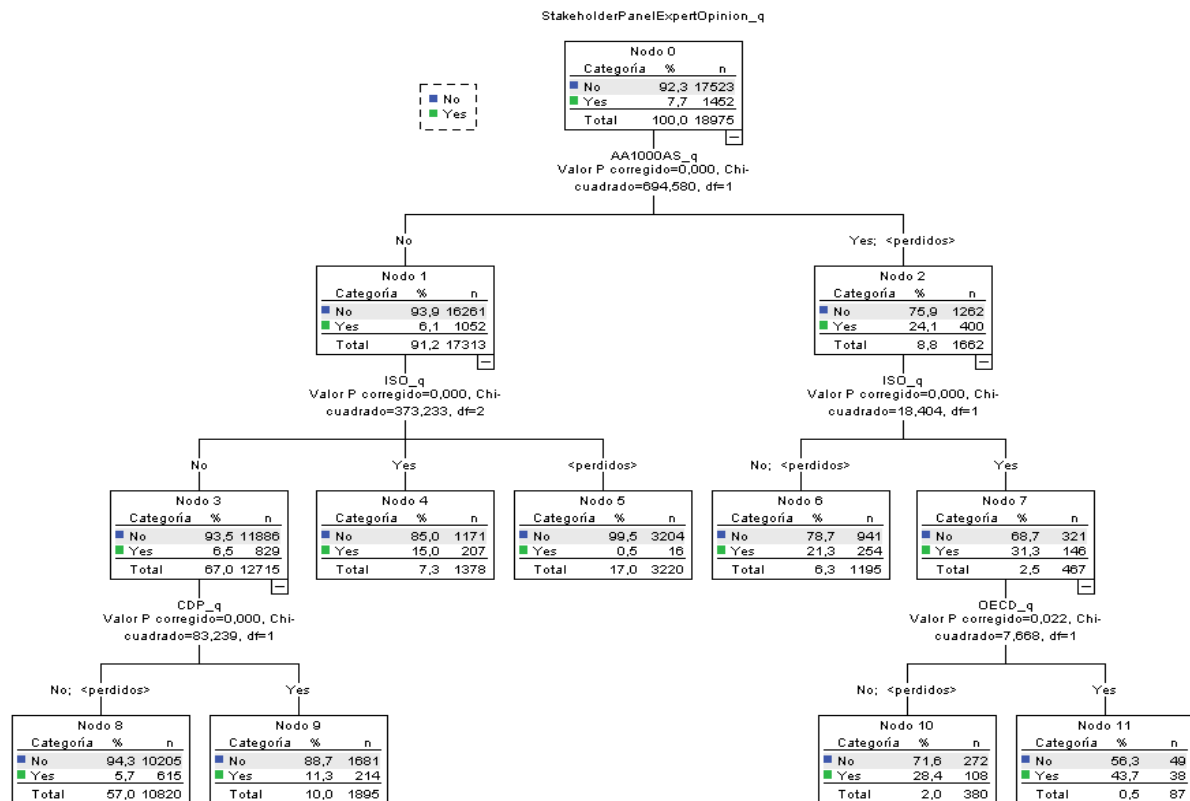
### Tree 4 Sustainability Reports with integrated economic information, with other international indicators



### Tree 5 Sustainability Reports with Stakeholder Panel Expert Opinión Information, by region, sectors and years.



## Tree 6 Sustainability Reports with Stakeholder Panel Expert Opinión Information, with other international indicators



## 9. References

- Alcántara, V., & Padilla, E. (2005). Análisis de las emisiones de CO<sub>2</sub> y sus factores explicativos en las diferentes áreas del mundo. *Revista de Economía Crítica*, 4(julio), 17–37.
- Bruce, J. P., Yi, H., & Haites, E. F. (1996). *Climate Change 1995: Economic and Social Dimensions of Climate Change: Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.
- Bruce, N., Pope, D., Rehfuss, E., Balakrishnan, K., Adair-Rohani, H., & Dora, C. (2014). WHO indoor air quality guidelines on household fuel combustion: Strategy implications of new evidence on interventions and exposure–risk functions. *Atmospheric Environment*. doi:10.1016/j.atmosenv.2014.08.064
- Canadian Government. (1981). *A New Perspective on the Health of Canadians, Lalonde Report 1974*. Retrieved from <http://www.phac-aspc.gc.ca/ph-sp/pdf/perspect-eng.pdf>
- Comisión de Transportes del Colegio de Ingenieros de Caminos, Canales y Puertos. (2010). *Libro Verde del Transporte y Cambio Climático*. Madrid: Comisión de Transportes del Colegio de Ingenieros de Caminos, Canales y Puertos. Re-

rieved from

[http://www.ciccp.es/ImgWeb/Sede%20Nacional/Transportes/Transporte\\_y\\_Cambio\\_Climatico%20%282%29.pdf](http://www.ciccp.es/ImgWeb/Sede%20Nacional/Transportes/Transporte_y_Cambio_Climatico%20%282%29.pdf)

- Eyraud, L., Wane, A., Zhang, C., & Clements, B. (2011). Who's going green and why? Trends and determinants of green investment (No. IMF Working Paper No. WP/11/296) (pp. 1–38). Washington, DC: Fiscal Affairs Department. International Monetary Fund. Retrieved from <http://www.imf.org/external/pubs/ft/wp/2011/wp11296.pdf>
- Fernández-Feijóo Souto, B. (2009). Crisis and Corporate Social Responsibility: Threat or Opportunity? *International Journal of Economic Sciences and Applied Research*, 2(1), 36–50.
- Giannarakis, G., & Theotokas, I. (2011). The Effect of Financial Crisis in Corporate Social Responsibility Performance. *International Journal of Marketing Studies*, 3(1), 2–10.
- GRI (2002) “Global Reporting Initiative Guidelines” [www.globalreporting.org](http://www.globalreporting.org).
- GRI (2004) “Global Reporting Initiative Guidelines High 5! A guide for Small and Not So Small Businesses”. GRI, Amsterdam.
- GRI (2008) Global Reporting Initiative Guidelines [www.globalreporting.org](http://www.globalreporting.org).
- GRI (2016). G4 Sustainability Reporting Guidelines. <https://www.globalreporting.org>.
- IPCC. (2014). Climate Change 2014: Mitigation of Climate Change Working Group III Contribution to the IPCC Fifth Assessment Report | Climatolo. Retrieved from <http://www.cambridge.org/es/academic/subjects/earth-and-environmental-science/climatology-and-climate-change/climate-change-2014-mitigation-climate-change-working-group-iii-contribution-ipcc-fifth-assessment-report?format=PB>
- Jacob, C. K. (2012). The Impact of Financial Crisis on Corporate Social Responsibility and Its Implications for Reputation Risk Management. *Journal of Management and Sustainability*, 2(2), 259–275.
- Karabrahimoğlu Y.Z. (2010). Corporate social responsibility in times of financial crisis. *African Journal of Business Management*, 4(4), 382–389.
- Loomis, D., Grosse, Y., Lauby-Secretan, B., Ghissassi, F. E., Bouvard, V., Benbrahim-Tallaa, L., Straif, K. (2013). The carcinogenicity of outdoor air pollution. *The Lancet Oncology*, 14(13), 1262–1263.
- Martín, J.A. and Navarro, J.L. (2014). The Environmental impact of economic activity on the planet: the role of service activities. *Economics and Policy of Energy and The Environment*. Pg. 53-78. 2014
- Martin, J.A., Pérez, C., Navarro, J.L. (2016): The Environmental Impact of Economic Activity on the Planet. In *Time Series Analysis and Forecasting*. Springer 2016.
- Njoroge, J. (2009). Effects of the global financial crisis on corporate social responsibility in multinational companies in Kenya, *Covalence Intern Analyst*

- Papers. [Online] Available: [www.covalence.ch/docs/Kenya-Crisis.pdf](http://www.covalence.ch/docs/Kenya-Crisis.pdf) (October 30, 2010). - Buscar con Google. Retrieved February 18, 2015, from [www.covalence.ch/docs/Kenya-Crisis.pdf](http://www.covalence.ch/docs/Kenya-Crisis.pdf).
- OCDE (2011). Guidelines for Multinational Enterprises. Recommendations for responsible business conduct in a global context. <http://www.oecd.org>.
- Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization Studies*, 24(3), 403–441. doi:10.1177/0170840603024003910.
- Pérez, C. (2015). *Técnicas Avanzadas de Predicción*. Garceta Grupo Editorial. Madrid.
- PLEON (2005) “Global Stakeholder Report 2005”. <http://www.pleon.com/Studies.86.0.html>
- Porter, M. E., & Kramer, M. R. (2002). The Competitive Advantage of Corporate Philanthropy. *Harvard Business Review*, 80(9), 56–69.
- UNDP. (2013). Human Development Report 2013. The Rise of the South: Human Progress in a Diverse World. UN Plaza, New York, NY 10017, USA: United Nations Development Programme. Retrieved from [http://hdr.undp.org/sites/default/files/reports/14/hdr2013\\_en\\_complete.pdf](http://hdr.undp.org/sites/default/files/reports/14/hdr2013_en_complete.pdf)
- UNEP. (2002). Sustainable consumption A Global Status Report. United Nations Environment Programme Division of Technology, Industry and Economics. Retrieved from [http://www.icspac.net/sectors/documents/SusCons\\_Global\\_Status\\_Report.pdf](http://www.icspac.net/sectors/documents/SusCons_Global_Status_Report.pdf)
- United Nations. (2000). United Nations Millennium Declaration A/res/55/2. Retrieved from <http://www.un.org/millennium/declaration/ares552e.htm>
- United Nations. (2014). The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet. Retrieved from [http://www.un.org/disabilities/documents/reports/SG\\_Synthesis\\_Report\\_Road\\_to\\_Dignity\\_by\\_2030.pdf](http://www.un.org/disabilities/documents/reports/SG_Synthesis_Report_Road_to_Dignity_by_2030.pdf)
- WHO. (2013). State of the science of endocrine disrupting chemicals - 2012. Retrieved from <http://www.who.int/ceh/publications/endocrine/en/>
- World Bank. (2010). World Development Report 2010. Washington, DC. Retrieved from <https://openknowledge.worldbank.org/handle/10986/4387>.
- World Economic Forum (WEF). (2013). The Green Investment Report - The ways and means to unlock private finance for green growth. The World Economic Forum (WEF). Retrieved from [http://www3.weforum.org/docs/WEF\\_GreenInvestment\\_Report\\_2013.pdf](http://www3.weforum.org/docs/WEF_GreenInvestment_Report_2013.pdf)
- Yelkikalan, N., & Köse, C. (2012). The Effects of the Financial Crisis on Corporate Social Responsibility. *International Journal of Business and Social Science*, 3(3), 292–300.

## Websites

*<http://www.unglobalcompact.org/> Página web oficial del Global Compact.*

*<http://www.sa-intl.org/> Social Accountability International (SAI), SA8000..*

*<http://www.accountability.org.uk/aa1000/default.asp> Institute of Social and Ethical Account-  
tAbility, AA1000.*

## 1. Author address

### **José Aureliano Martín Segura**

University of Granada.

Business Management Department.

[aurelianomartin@ugr.es](mailto:aurelianomartin@ugr.es)

### **César Pérez López**

Complutense University of Madrid

Department of Statistics and Operations Research

[cesar.perez@ief.minhap.es](mailto:cesar.perez@ief.minhap.es)

### **José Luis Navarro Espigares**

University of Granada.

International and Spanish Economics Department

[jnavarro@ugr.es](mailto:jnavarro@ugr.es)