

RESEARCH ARTICLE

Circular economy and environmental disclosure in sustainability reports: Empirical evidence in cosmetic companies

Riccardo Tiscini¹ | Laura Martiniello¹ | Rosa Lombardi² 

¹Department of Economics, Mercatorum University of Rome, Rome, Italy

²Department of Law and Economics of Productive Activities, Sapienza University of Rome, Rome, Italy

Correspondence

Rosa Lombardi, Department of Law and Economics of Productive Activities, Sapienza University of Rome
Email: rosa.lombardi@uniroma1.it

Funding information

Universita degli Studi di Roma La Sapienza

Abstract

The purpose of this paper is to investigate the content and quality of circular economy (CE) and environmental information (CEEI) disclosure in sustainability reports. Additionally, it provides suggestions for heightening CEEI disclosure. Using the content analysis, we analysed the changes that took place after the European Union (EU) action plan (2015) selecting a sample of sustainable reports in the cosmetic industry in Italy in 2014 and 2019 years. We applied the Climate Disclosure Standard Board (CDSB) framework focused on 12 reporting requirements designed to encourage corporate standardized disclosure of environmental information. Our analysis is performed through a frequency term analysis. Additionally, to measure the general shift of semantic over the two years towards CEEI, a semi-supervised topic modelling approach was applied, whose topics were obtained by aggregating all terms with a significant variation from the content analysis. Findings show that the recent reports (2019) include terms related to the environment in a slightly more frequent way compared to 2014. We provide stronger evidence of the shift in the origin of the topics, being coherent with the changes introduced from the EU 2015 act, and the requirements of the CDSB framework nevertheless the CE seems still under-reported in the area of governance, strategy, management and performance. The paper discusses the need for further Institutional (EU directives), regulatory (CDSB framework) and stakeholders' pressure (on companies). Finally, the implementation of an integrated reporting for social, economic and environmental disclosure is suggested as a way to ensure an effective CEEI disclosure.

KEYWORDS

CDSB framework, circular economy, cosmetic industry, environmental disclosure, environmental reporting, sustainability report, topic modelling, value relevance

1 | INTRODUCTION

Corporate social responsibility (CSR) disclosure is a field of study widely developed in the last two decades (Khan et al., 2021; Landau

et al., 2020). The value relevance of non-financial information provided by sustainability reports has been recognized by institutions and scholars. The European Commission, in, 2001, defined CSR 'as a concept whereby companies integrate social and environmental concerns

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2021 The Authors. Business Strategy and The Environment published by ERP Environment and John Wiley & Sons Ltd.

in their business operations and their interaction with their stakeholders on the voluntary basis'. It became a tool for companies to implement the social and ethical principles within organizations, and it was also referred to as 'social innovation' (Rexhepi et al., 2013).

Some authors started investigating the corporate environmental information, connotation and concept of circular economy (CE) and environmental information (EI) that became mature in the recent years. CE is defined as 'an important way to protect the environment and resources, and to achieve sustainable development; it can transform a traditional linear growing economy which depends on resource consumption into an economy that relies on the development of ecological resources circulation'. The concept of CE expanded to new issues as economic growth and political strategy for the development and implementation of new business models (Geissdoerfer et al., 2017). The transition from a linear economy to a CE, where material flows regenerate and consequently reduce the demand for virgin raw materials, raised the attention to models of reuse and recycling of products. This represents an opportunity to respond to the challenges of the future both nationally and internationally at the economic and employment level.

In this context, the topic of CE and EI became high on the European political agenda (EC, 2014a, 2014b, 2015, 2015b), intending to promote economic growth by creating new businesses and job opportunities, saving materials' cost, dampening price volatility, improving the security of supply while at the same time reducing environmental pressures and impacts. It was estimated that eco-design, waste prevention and reuse could bring net savings for EU businesses of up to EUR 600 billion, while at the same time reduce greenhouse gas emissions. Also, the new Agenda 2030, which addresses people to the planet and prosperity, includes 17 specific sustainable development goals (SDGs) through which countries around the world have committed themselves to common goals. Agenda 2030 stresses that to implement this change of mentality, it is necessary that companies, in addition to being incentivized to apply sustainable practices, must disclose information on sustainability practices in their annual reports.

Additionally, in 2019 the Climate Disclosure Standard Board (CDSB) an international consortium of business and environmental nongovernmental organizations (NGOs) committed to advancing and aligning the global mainstream corporate reporting model, published the 'CDSB Framework for reporting environment and climate change' (www.cdsb.org). It aims at setting a standardized approach to reporting environmental information in mainstream reports (as CSR/sustainability reports). According to CDSB environmental information included in the organization's reporting must include: (i) natural capital dependencies; (ii) environmental results; (iii) environmental risks and opportunities; (iv) environmental policies, strategies and targets; and (v) performance against environmental targets.

Circular economy and environmental information (CEEI) disclosure is an emerging field of study directed to academic and practical communities. Changes in companies' organizational and business models become necessary to incorporate sustainability into business. Environmental pollution and resources shortage are among the most

serious problems that companies are facing and will face shortly because the problems of resources and environment is an important limiting factor of sustainable development. CE pursues exactly these objectives: low pollution, low emission, reduction, recycling, through a circular design. The linear design differs from the circular design because the first pays much more attention to the production of a product while in circular design; there is particular attention to the economic and social aspects as well as environmental well-being. It became necessary overcoming traditional design by implementing a sustainable design by creating and optimizing new business models for the transition to a circular economy (Prendeville & Bocken, 2017).

CEEI is different from 'sustainability' because less focused on economic and social aspects. Sustainability reports are not only focused on environmental issues and also deepen 'economic' and 'social' fields. Following the triple bottom line (Elkington, 1994), these two other fields are as important as environment; nevertheless, it is not in the scope of this work to analyse these aspects. In this paper, we limit the analysis to CEEI information delivered by sustainability and CSR reports. Some scholars assume that what companies provide about CE in the sustainability reports delivers relevant information about business thinking around the concept and allows for providing insights and trends about the business uptake of CE (Niero & Stewart, 2018). They undertake a content analysis on 46 sustainability reports highlighting that 'in reviewed CS reports, CE is mostly associated with the idea of recycling and reusing, its systemic dimension is referred to in one-third of the sample and in most CS reports it is associated with concrete activities, as opposed to just general statements'.

This paper aims to explore CEEI in sustainability/CSR reports drafting some interesting insights for academic and practical communities, and framework setters. We suggest that CEEI and sustainability/CSR are increasingly interconnected concepts fostering the goals of sustainable development and environmental protection. Particularly, we investigated organizations' behavioural change through their non-financial reporting identifying the level of compliance to CE principles. Thus, we provide suggestions for heightening CEEI disclosure in terms of quality and type of information.

Adopting the content analysis method, we analysed the changes that took place after the EU action plan (2015) in a sample of 26 reports published by cosmetic companies (CCs) in Italy as representative sector and country. We analyse and compare sustainability reports over two periods: 2014 and 2019. We applied the Climate Disclosure Standard Board (CDSB) framework based on 12 reporting requirements designed to encourage standardized disclosure of environmental information by companies (www.cdsb.org). We adopted a frequency term analysis for each reporting requirement by CDSB. To measure the general shift of semantic over the two years towards CEEI, a semi-supervised topic modelling approach was applied, whose topics were obtained by aggregating all terms with a significant variation from the content analysis.

Findings show that the above reports in 2019 include terms related to the environment in a slightly more frequent way compared to 2014. We provide stronger evidence of a shift (between 2014 and

2019) in the origin of the topics, being coherent with the changes introduced from the EU 2015 Act and the requirements of the CDSB Framework. This paper discusses the alignment in disclosure between sustainability reports and CEEI according to institutional and regulatory increased pressure (EU directives and CDSB Framework) on companies. The implementation of an integrated reporting for social, economic and environmental disclosure is suggested as a way to increase the CEEI quality and disclosure in the cosmetic sector.

The remainder of the paper is organized as follows: Section 2 examines relevant literature. Section 3 presents the research methodology. Section 4 contains the main findings from the report content analysis in terms of most frequent items and topics and discuss the obtained results, and, finally, Section 5 presents the conclusions and limitations of the paper, identifying future research activities.

2 | LITERATURE REVIEW

The connotation and the concept of CE are being applied to the development of large numbers of families, businesses and even countries, to protect resources and the environment and achieve sustainable economic development (Bom et al., 2019; Saidani et al., 2019). The circular design concept also covers the cosmetics sector as one of the most important economic sectors. CCs have to use raw materials of natural origin, design from the beginning durable products whose packaging is also easily reusable, recyclable and easily disassembled, combat obsolescence while preserving products and materials to produce maximum value, and so forth.

The relationship between CE, sustainability (CSR) and accounting information disclosure started to be studied together with the effects of corporate ownership governance and institutional pressure on environmental protection (Morioka et al., 2016). Some authors combined the concepts of CSR and CE defining CSR as 'the corporate management philosophy and set of practices that better frames sustainability circular economy draws from the purest values of CSR and puts them to practice. Both help achieve the sustainable development goals, and sustainable behaviour at large, for both citizens, institutions and corporations' (Leandro & Paixao, 2018).

The transition from the linear economy to CE (where material flows regenerate and consequently reduce the demand for virgin raw materials, leaving room for models of reuse and recycling of products) represents a valid opportunity to respond to the challenges of the future both nationally and internationally (Prieto-Sandoval et al., 2018). The corporate management philosophy of companies started to be stated also into mandatory and non-mandatory reports that better frames CE identifying and communicating specific objectives and disseminating best practices to achieve SDGs.

The implementation of CE framework still encounters many limitations and barriers that prevent its diffusion (Fortunati et al., 2020; McDonough, 2002). Some authors observe that CE relevant research has evolved primarily as research on waste generation, resource use and environmental impact while neglecting business and economic perspectives (Lieder & Rashid, 2016). Others authors criticize the lack

of strategic and managerial perspective in CE research able to support changes to business model and operations that managers need to cope with and communicate throughout the entire organization when going circular. This may also imply changes in the company's organizational culture (Murillo et al., 2020). These authors tried to identify a 'key-impact map summarizing the most influential changes in each area that assist in the management of businesses towards greater sustainability'.

Another gap to CE diffusion has been identified in performance indicators or assessment methodologies, lacking in most CS reports which elaborate on CE. Niero and Stewart (2018) observe that only a minority of companies present a dedicated set of key performance indicators (KPIs) for their CE approach.

According to Moreno et al. (2016), 'Most academic and grey literature on the Circular Economy has focused primarily on the development of new business models, with some of the later studies addressing design strategies for a Circular Economy, specifically in the area of resource cycles and design for product life extension'. The circular design minimizes the use of raw materials by minimizing loss of value, extending the life cycle and improving resources. The linear design in CCs differs from the circular design, in which the company pays much more attention to the aesthetics and advertising campaigns around that product (Meinel & von Thienen, 2016). The importance of the design and role of designers in creating increasingly sustainable models have been much discussed to propose an alternative and responsible approach with terms such as: 'eco-design', 'green design', 'environmental design', 'sustainable design'. Particular attention has been devoted to environmental well-being obtained by creating and optimizing new business models for the transition to a circular economy (Prendeville & Bocken, 2017).

Environmental sustainability scenarios have been linked to some key principles such as the use of production processes capable of significantly reducing energy consumption, greater durability of the product, ease of disassembly of materials, the possibility of reusing a product or service at the end of its life (Ramani et al., 2010). These principles translated into environmental, social and economic terms and disclosed in non-financial reports become a tangible benefit for the society. Terms as 'circularity', 'environmental stewardship', 'eco-design', 'suppliers environmental assessment' are increasingly used and testify a change in the companies' managerial approach. It refers to new strategies that address relevant issues of environmental protection, water pollution, air quality, and waste management, with an approach that is recognized also from the use of different terms (Pascu & Nedea, 2013; Romli et al., 2015).

In the cosmetics industry, the transition to circular models can be used to change the product 'design' with the aim to increase durability. This is a key element to instil confidence in the consumer. Design more 'durable products' with 'green formulation', design for standardization and compatibility for certain parts of the product, design for dis-assembly and reassembly where the products and their parts can be easily separated and reassembled and 're-used' (Bocken et al., 2016) are specific themes regarding new processes of production-oriented to circularity. The first companies to integrate sustainable/

CSR policies in their development strategy were (and still are) multinationals (Nemtanu, 2012). Also, the cosmetics companies are distinguished organizations which by the nature of invented/produced/distributed products have a direct and personal impact on the consumer.

Environmental disclosure literature also discusses problems regarding the limited use of indicators and quantitative assessments of Circularity objectives. Haupt and Hellweg (2019) observed the indicators used to assess circularity fail to cover the environmental perspective and the most mentioned reasons to move from a linear to a circular economy. Some authors found a positive association between environmental disclosure and market value (Blacconiere & Northcutt, 1997); others argued that climate disclosure practices and regulation have provided an opportunity to reinforce the ideological landscape of neoliberalism. They studied the case of the CDSB showing that market logic underpins climate policy in absence of an actively constructed ideological project requiring the mobilization of significant economic interests and resources. The environmental decline has provided scope for new forms of policy making, yet these emergent policies and policy-making bodies remain in many cases poorly understood.

Many authors undertake empirical analysis mainly through content analysis and case studies in several sectors including consumer goods, ICT and services, automotive, and manufactures. Among them, only a few studies concern cosmetic sectors. Bom et al. (2019) through an analysis on the sustainability of cosmetic products show that the identification and management of multiple environmental, economic, social and safety aspects for consumers in cosmetic industries are not immediate. They affirm that the 'cosmetic industry needs to adapt and innovate to design products and processes that can improve the sector sustainability, acting across the entire value chain' and that 'it is essential to understand which factors to consider when aiming for sustainability'. As indicated by Ness et al. (2007), the sustainability assessment types can be categorized in three approaches: (i) indicators/indices as simple and quantifiable measures to evaluate sustainability; (ii) product-related assessments more focused on environmental dimensions of sustainability and always based on the life cycle of the product; (iii) integrated assessment that includes qualitative and quantitative measures.

The literature gap is identified in the ability of companies to adapt to frameworks and standards provided by emergent policies and policy making bodies, using effective indicators to assess circularity and cover the environmental perspective. Through the literature analysis, it is possible to detail CEEI frameworks identifying 12 'requirements' relevant in firms reporting. These 12 requirements have been also designed by CDSB to encourage standardized disclosure of environmental information that complements and supplements other information in mainstream reports (mainly CSR reports). Our research questions are the following:

RQ1: *What changes emerge in companies' reporting priority by comparing 2014 and 2019 reports? Which are the most reported terms and topics?*

RQ2: *The terms disclosed in CSR reports are coherent with the CDBS framework requirements?*

RQ3: *Do CE strategic and managerial policies have been properly described?*

RQ4: *Do CE Performance has been disclosed through a dedicated set of key performance indicators?*

3 | RESEARCH DATA AND METHODOLOGY

We adopted a qualitative method using the content analysis and frequency analysis to answer our research questions. Sections below present our research data collection and analysis.

3.1 | Data collection and cleaning

We created a sample of sustainability reports from 13 companies operating in the CCs, as representative industry in the environment' attentions. The selection of multinational companies' reports derives from their adequate resources to invest and more pressure (normative, consumer's investment community, stakeholders) to produce sustainability reports. Consequently, they are expected to be able in developing a good environmental disclosure. According to literature size and organizational characteristics play a large part in how Sustainability is viewed and understood. Size appears to matter regarding the reputational and community issues.

Sustainability reports were collected from 2014 and 2019, ending up with a total of 26 reports. The decision behind the usage of a 4 years' gap is motivated by several reasons. First, we expect a growing institutional pressure at the European and national level with the new environmental reporting framework (as CDSB Framework). Similarly, we also expect greater attention to consumers who became more exposed to environmental issues in the meanwhile, developing their sensitivity.

Sustainability reports (at their initial state) required a pre-processing phase to retain only those lexical parts which were recognized as not informative for the analysis. We began by performing structural filtering, discarding all those pages without meaningful content. Each report was manually analysed, marking all those pages considered out of the scope for the analysis. A page is said to be out of scope if it mainly contains information about the structure of the report or the company. Blank pages and those containing information about an element of the report—like the title of a chapter or a section—were discarded as well. Reports were then cleaned from their spurious textual content. Therefore, we removed any date, URL, email address, symbol, stop word, punctuation, or repeated space. We also removed page headers and footers whose only function was to remind the reader about the current section and/or chapter. Likewise, pictures were excluded since few studies considered them too ambiguous and require content analysis rules that are too complex (Steenkamp, 2007).

3.2 | Qualitative overview of most frequent terms

The first analysis provided a qualitative assessment of the shift in the lexicon towards CE and sustainability topics between 2014 and 2019. We employed an analysis workflow represented in Figure 1. We first counted the number of occurrences of words among the reports in the two years, whose content was already pre-processed during the data cleaning phase. Such a counting produced two sets of words, one for each year, with their corresponding frequency that describes the relevance of terms concerning the content proposed in the reports. Moreover, the frequency was employed to sort the two sets in descending order, which served as a proxy for retaining the top 30 most frequent words. In the end, we provided a visual description of the filtered and sorted sets through a word cloud in which the size of the words is directly proportional to their frequency. In this way, a qualitative comparison between the relevant lexicon can be performed by looking at the word dimensions on the two plots, providing a general measure of the existence of a lexical shift.

3.3 | Content analysis following CDSB framework

The qualitative findings reported from the previous overview were extended from a quantitative perspective through a content analysis approach. It can be defined as a research technique for making reproducible and valid inferences from texts to the contexts of their use (Krippendorff, 2004). This research used the Weber (1985) scheme to provide the most transparent content analysis process possible. Weber's scheme indicates a coding system to achieve a satisfactory level of reliability (i.e., different people code the text in the same way over some time) and validity of the results. The coding system is at the heart of content analysis since it specifies the information to search and how this should be classified. A good coding system enables researchers to identify the important categories and presents the necessary conditions for the method's objectivity.

The analysis began with a first step in which authors started coding a sample of text. There are several cases of schemes applied to

investigate the 'contents' and 'quality' of sustainability reports by using categories of items. According to some authors (Cinquini et al., 2012) a good coding system enables researchers to identify the important categories and presents the necessary conditions for the method's objectivity.

The coders (i) read the CDSB Framework identifying the main categories of analysis also by a merger of the 12 requirements envisaged by the framework; (ii) each category contain keywords that allow to identify specific items of analysis; (iii) to test the CEEI level of disclosure, content analysis was performed on a sample of two sustainability reports by two different coders. The 'coders' performed preliminary the content analysis tracing the topics covered in the sustainability reports to the categories and items of the CDSB framework.

The framework of analysis was partially modified after a discussion between the coders. As an agreement between the coders regarding the categorization of the items was high, only a few items needed to be discussed. For the content analysis, 61 'items' were identified, divided into the 12 'categories' correspondents to the 'reporting requirements' provided by CDSB framework. The following categories were applied:

1. REQ.01 Governance. Disclosures shall describe the governance of environmental policies, strategy and information. It includes items as environmental policies/environmental policy; environmental strategy; leadership.
2. REQ.02 Management's environmental policies, strategy and targets. Disclosures shall report management's environmental policies, strategy and targets, including the indicators, plans and timelines used to assess performance. It includes items as green chemistry; product responsibility; responsible sourcing; distribution channels; packaging; recycling.
3. REQ.03 Risks and opportunities. Disclosures shall explain the material current and anticipated environmental risks and opportunities affecting the organization. It includes items as environmental risks; greenhouse gas (GHG) emission(s)-non-GHG emission; environmental reputation; environmental stewardship.

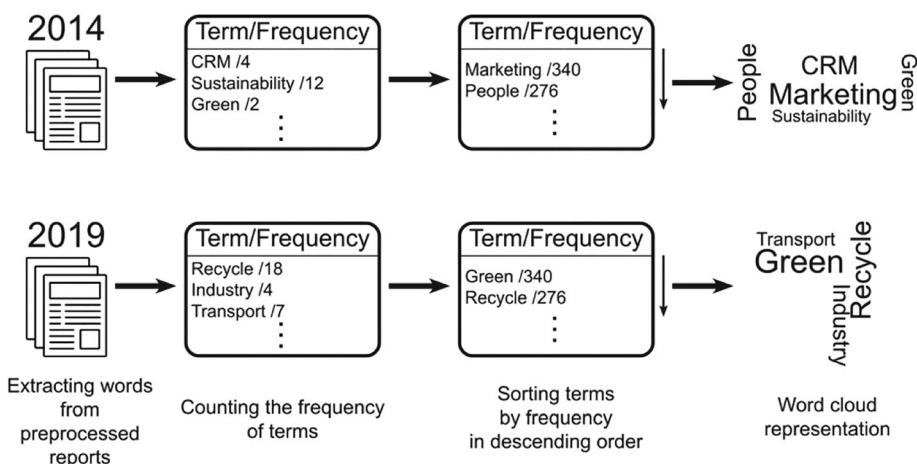


FIGURE 1 Word cloud terms extraction pipeline

4. REQ.04 Sources of environmental impact. Quantitative and qualitative results, together with the methodologies used to prepare them, shall be reported to reflect material sources of environmental impact. It includes items as non-renewable resource(s); CO₂ emission; energy consumption; gas emission; renewable resource(s); waste reduction; water consumption.
5. REQ.05 Performance and comparative analysis. Disclosures shall include an analysis of the information disclosed in REQ-04 compared with any performance targets set and with results reported in a previous period. It includes items as environmental results; future (forward looking approach); investments.
6. REQ.06-12 Reporting. Disclosure shall include information that includes a temporal dimension and/or its conformance with specific environmental standards and guidelines. It includes items as presence of a summary in the environmental impact of the organization (YES/NO); use of environmental standards/guidelines (YES/NO); forward looking approach (YES/NOT); non-specific time approach (YES/NOT); time basis reporting at least annual (YES/NOT); ISAE 3000 or other assurance (YES/NO). According to Gray et al. (1995), an accurate definition of the 'categories' of content analysis allows more precise identification of the type of information to be analysed in the document, which reduces the implicit subjectivity of this research method. The implementation of this analysis was performed to provide a systematic approach that requires little to no external human intervention. We first focused on the structure of words, reducing any inflectional existing form. Indeed, we applied a stemming process, which is commonly applied in the field of information retrieval. It consists of a set of operations performed on words that affixes their prefixes or suffixes, reducing the words to their root (stem) form. For example, the result of a stemming operation applied on the words 'package', 'packages' and 'packaging' will be 'package', removing all the suffixes. This approach allows performing content analysis without focusing on the exact match between the items, overcoming word inflation and capturing their general usage. Over the years, several stemming approaches have been proposed (Jivani, 2011) based on the lexical and statistical properties of terms. In our case, we applied the PorterStemmer algorithm since it produces a high quality of outputs if compared with the majority of the other stemming algorithms in circulation (Jivani, 2011). This algorithm relies on a set of definitions, rules and steps which are the following:
 7. The algorithm defines as a vowel v all those letters equal to a, e, i, o, u, y whilst a consonant c is defined as all those letters that are not a vowel. This definition can be exploited such that a sequence of one or more consonants or vowels is defined with the letter C and V , respectively. For example, the word green can be coded as CVC , where $C = \{gr\}$, $V = \{ee\}$ and $C = \{n\}$.
 8. The algorithm relies on a way of representing words as $[C](VC)^m[V]$, in which $[C]$ and $[V]$ represent the arbitrary presence of consonants and vowels respectively, whilst $(VC)^m$ indicates the repetition of a sequence of vowels and consonants repeated m times, with $m \geq 0$. In the previous example, the word green

reflects a structure that corresponds to $C(VC)^1$ where the final sequence $[V]$ is omitted since its presence is not mandatory.

9. A set of rules is defined in order to manipulate or remove the textual content of the suffices. Such rules can be generalized in the form

$$(\text{condition})S_1 \rightarrow S_2,$$

where S_1 indicates the suffix of the word before the transformation, S_2 indicates the suffix of the word after the transformation and (condition) is the condition that the stem of the word must follow to modify its suffix S_1 into S_2 . The list of conditions depends on the structure of $(VC)^m$ and the transformations include the deletion or the modifying of letters existing in S_1 .

10. The algorithm follows a sequence of five steps, each of them with a unique set of rules, producing a stemmed version of the word taken as input. For example, the word *green* would not be affected by this stemming process, whilst the word *greens* will be stemmed into *green*. The application of such a stemming process was performed both on the pre-processed terms that appeared in the reports and on the category items. This strategy was crucial in order to manage the content analysis as a lookup operation between each stemmed word appearing in the reports and their corresponding stemmed category item, if existing. In the end, we retrieved the number of occurrences for each term in 2014 and 2019, providing a first quantitative approach that investigates the usage of terms related to CE and sustainability.

3.4 | Quantifying adherence on CE and sustainability through seeded LDA

We searched for the most representative category for each collected report. Reports were treated singularly on both years while keeping their stemmed structure. We applied a topic modelling approach that analyses words from different documents and creates word clusters with a common meaning. The typical approach involves the usage of latent Dirichlet allocation (LDA), an unsupervised method that maps each document into a list of topics based on the words they contain.

Observing a shift of the report narratives towards specific topics, we applied a variation of the previous algorithm which is called SeededLDA (Jagarlamudi, 2012). It is commonly referred to as a semi-supervised topic modelling algorithm in which topics can be predefined through a list of words, called seeds. This list was built to be coherent with the rest of the study. Therefore, we included only those terms that content analysis associated with a variation of their frequency of at least 10% between the two years. This choice produced seeds belonging to six topics: governance, environment, environmental impact, circularity, management and standards. A final topic, called other, was added to serve as a residual for all those documents that could not be represented with the list of words previously obtained. The result of this analysis consisted in the classification of documents from each year, based on their content, with the most

representing topic chosen from the list. In the end, we obtained the frequencies of topics concerning each year, providing a measure that quantifies a semantic shift towards CE and sustainability.

4 | FINDINGS AND DISCUSSION

4.1 | Terms and topic frequency analysis

This first research question was explored through (i) a frequency term analysis and (ii) a topic modelling. The frequency analysis shows how CEEI's terms frequency changes over the two observed periods (2014 and 2019). In particular, in 2014 reports the 'word cloud' of terms gives evidence of frequent use of the words: employees, product, group, business and management. Environmental terms do not seem to be a central item of information to disclose.

The same analysis performed on 2019 sustainability reports shows similar results. Employees, product, business and management are still the most used terms followed by group, health, global and safety, emission, standards and compliance. These reports seem to disclose only slightly greater attention to the CEEI terms. Figure 2 represents two word clouds applied on the union of the reports for each year. Qualitatively, the result shows a remarkable similarity on the lexicon applied on both years referring to the 50 most used words. By looking at the words from 2019, there is a slight introduction of terms that can refer to the application of the EU 2015 Act, such as emissions, standards and compliance.

Nevertheless, at the variation of frequency of a sample of terms extracted from the 26 reports (see Appendix A list of word extracted) it is possible to appreciate a considerable increase of reports quoting CE. The use of the term 'circular economy' increases 1.650%, and the use of the term 'circularity' increases 1.120% between 2014 and 2019. Moreover, it is possible to observe a consistent increase in the use of the term 'environmental stewardship' which raise 733%. Other increases concern words related to firms' specific environmental policies and strategies as (i) green chemistry +146%, (ii) product responsibility +200% and (iii) responsible sourcing +528% in 2019 comparing to 2014 reports. Of great interest, it is also the increase in the use of terms as GHG emission(s) +133% and CO₂ emission +50%. Finally,

the increase in the use of the term GRI (global reporting indicators) +120% signals the adoption in many companies of new reporting standards.

Vice versa, the absence of the terms as C-ratio, environmental indicator(s), environmental ratios, ESG ranking points out that attention is still limited to the use of performance indicator and specific environmental impact ratios. Then, the paper analyses the diversification from a semantical perspective in 2014 and 2019 reports through a topic modelling approach. We discover a shift from 2014 to 2019 in the origin of the topics, being more coherent with the changes introduced from the EU 2015 Act and CDSB framework. Topic modelling results show the relation between CSR reports and circular economy emphasizing the renewed approach by companies in establishing strategies. The frequency analysis can be summarized as follow to have an immediate perception of change in the terms used in 2014 and 2019.

An in-depth analysis is applied on relevant topics clustered as follows:

1. Governance: strateg*, polic*, leader*
2. Environment: bio*, soil, packag*, recycl*, sustain*, ghg, plastic, plant*, green*, natural
3. Environmental Impact:environment*, ghg*, water, gas*, ethic*, renewable*, waste reduction, water reduction, water consumption, energy consumption, renewable resource*
4. Circularity:circular economy, circular*, diversification, environmental assessment
5. Standards:isae, gri, cratio, esg, csr, compliance
6. Management:brand*, program*, division, campaign*, worldwide, digital

The barplot (Figure 3) synthesizes the variance in frequency of six major topics: governance, circularity, environment, environmental impact, management, standards and others. Circularity and the environmental topic (CEEI) show a significant increase growing from a percentage relevance of about 7.69% in 2014 to relevance of about 23.08% in 2019, also the topic environmental impact increases to 15.38%. Vice versa, the topic related to standards remained stable over the two years, signalling a still predominantly descriptive and

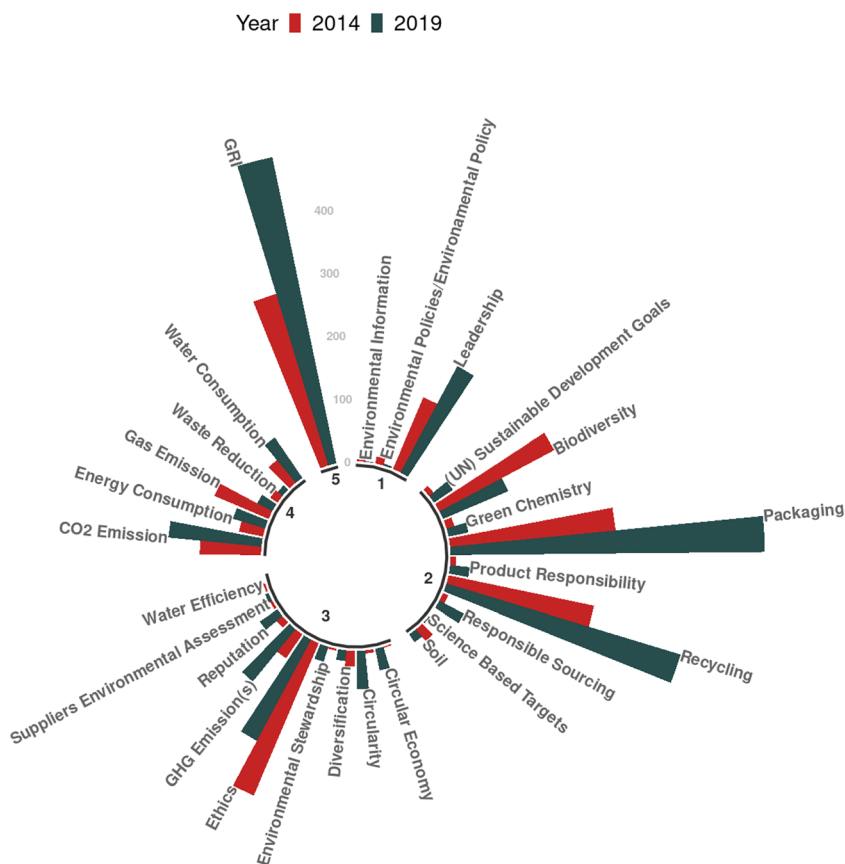


Word Cloud Reports 2014

Word Cloud Reports 2019

FIGURE 2 Word cloud terms from 2014 and 2019 [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 3 Frequency analysis results [Colour figure can be viewed at wileyonlinelibrary.com]



qualitative approach in the 2019 reports. Finally, more traditional topics as governance and management decrease consistently in 2019 along with the residual category 'other'.

4.2 | Topic modelling approach and common meaning's word clusters

To verify if CEEI terms are sufficiently disclosed in relation to the CDBS framework (RQ2) and if CE strategy, management and performance (RQ3–RQ4) represent topics sufficiently detailed in the reports, the paper presents a frequency analysis articulated in six spider plots. Every spider plot represents one of the 'reporting requirement' provided by the CDSB framework. Each 'requirement' is analysed through the keywords used in CDBS framework to identify that specific requirement. The following categories are analysed: (i) REQ-01 governance; (ii) REQ-02 management's environmental policies, strategy and targets; (iii) REQ-03 Risks and opportunities; (iv) REQ-04 Sources of environmental impact; (v) REQ-05 performance and comparative analysis; (vi) REQ-06-REQ.12 are placed in a single category that requires a qualitative analysis of the reports mainly focused on reporting policies and reporting period (Appendix C).

Requirement n.01, implying a governance and a strategic approach oriented to circularity, does not seem fully respected because CCs reports are still focused on traditional governance. The prevailing term was and still is 'leadership'. This finding is in line with

the vein of literature which reports a lack of strategic and managerial perspective in CE reports and in previous CE researches necessary to support real changes to companies' business model (Lieder & Rashid, 2016; Murillo et al., 2020).

Req.02 is tested through the use of multiple environmental terms able to identify a management orientation to environmental policies, strategies and targets. Three terms are prevailing in 2019 reports and signal managerial attention to some specific CCs processes: packaging, recycling, biodiversity. Req. 2 seem partially achieved because of greater attention to managing these central processes for CCs with a renewed attention to the environment. Nevertheless, a strategic and target-based environmental approach seems still underreported in CCs.

Req. 03 analysis shows a reduction in the use of the term 'ethics' and major attention to words like reputation and green/change business model and circularity or circular economy signalling a gradual change towards new business models more attentive to the environment.

Req. 04 analysis shows increased attention in 2019 reports to some sources of environmental impact and in particular: CO₂, water and energy consumption. The spider plot shows an increased area of attention to these themes. This finding is in line with the vein of literature which reports a relevant evolution of actions related to waste generation and green resource provisions while neglecting business and economic perspectives (Lieder & Rashid, 2016).

Req. 05 analysis shows increased use of the term 'GRI' but little use of words like environmental indicators, ratios, results and

investments. Req. 06-012, unlike the other Req. analysis, presents qualitative monitoring of the reports aimed at understanding the evolution in the type of reporting adopted by the CCs. It shows that reports are still mainly annual based or with a non-time specific approach. Moreover, they show increased attention to assurance policies and still limited use of specific environmental standards and guidelines, apart from GRI. Also this finding seems to confirm previous empirical studies which highlight that only a minority of companies present a dedicated set of CE specific KPIs. (Niero & Stewart, 2018).

5 | CONCLUSION AND LIMITATION OF THE STUDY

This study contributes to investigate the content, frequency and quality of CEEI disclosure in sustainability reports (Khan et al., 2021; Landau et al., 2020) discovering the value relevance of non-financial information by such reports. It investigates several terms and topics over two years (2014 and 2019) in a sample of 26 sustainability reports published by 13 Italian CCs. In relation to the RQ1, *What changes emerge in companies' reporting priority by comparing 2014 and 2019 reports? Which are the most reported terms and topics?*, the results demonstrate, mainly from topic analysis, an emphasis on environmental disclosure, the most reported topic in 2019 include: GRI, packaging, recycling, GHG emission, CO₂ emission (see Figures 3 and 4).

At the same time, the analysis highlights a shift in main reporting topics with a consistent increase of the environmental topics (see Figure 4.). The use of these new topics in CCs reporting indicates a CEEI good disclosure, at a descriptive level. Moreover, CEEI disclosure quality analysis indicates that information is mainly expressed in non-financial, quantitative and non-time-specific terms, while forward-looking information is still at a low level of disclosure. Data also shows that the use of ratio and quantitative objective is scarce. In line with circular economy and environmental disclosure literature, there are

still problems regarding the use of ratios and effective environmental performance measures (Haupt & Hellweg, 2019). Nevertheless, results indicate that sustainability reports provide a considerable set of CEEI disclosure that could be used by stakeholders to acquire useful information on a firm's environmental activities but less information on real companies' performance. In relation to RQ2: *The terms disclosed in CSR reports are coherent with the CDBS framework requirements?* reports 2019 evolves in the directions of a disclosure only partially coherent with REQ 2 'management's environmental policies, strategy and targets', REQ.3 'risks and opportunities' and REQ-04 sources of environmental impact. Still, a limited disclosure is perceived for REQ-01 environmental governance and REQ-05 performance and comparative analysis that need to be integrated and enhanced in future reporting. Moreover, it emerges the importance of a more standardized reporting and measurement system because of a lack of connection between research and practitioner's communities and firm's practices to increase measurement activities and improve environmental performance disclosure.

In relation to RQ3 and RQ 4, we identify areas for future improvement mainly related to a renewed managerial and strategic approach to company management with an impact on the business model used, that seems to be still very traditional. A change that is certainly more profound than the one experienced so far and which implies a cultural change inside and outside the company. This study brings out some consideration and several implications. The considerations are that nevertheless a greater attention in companies reporting to environment (resource, reuse, recycle, etc.) to encourage a real circular economy revolution it is necessary to implement renewed business models. They require economic and cultural investments to be accepted by the top management of the company but also by consumers. It is necessary, in summary, to fight compliance culture that pervades many of these firms making perceived benefits of Circularity greater than costs and risks.

The implications that emerge from these considerations are related to the need of:

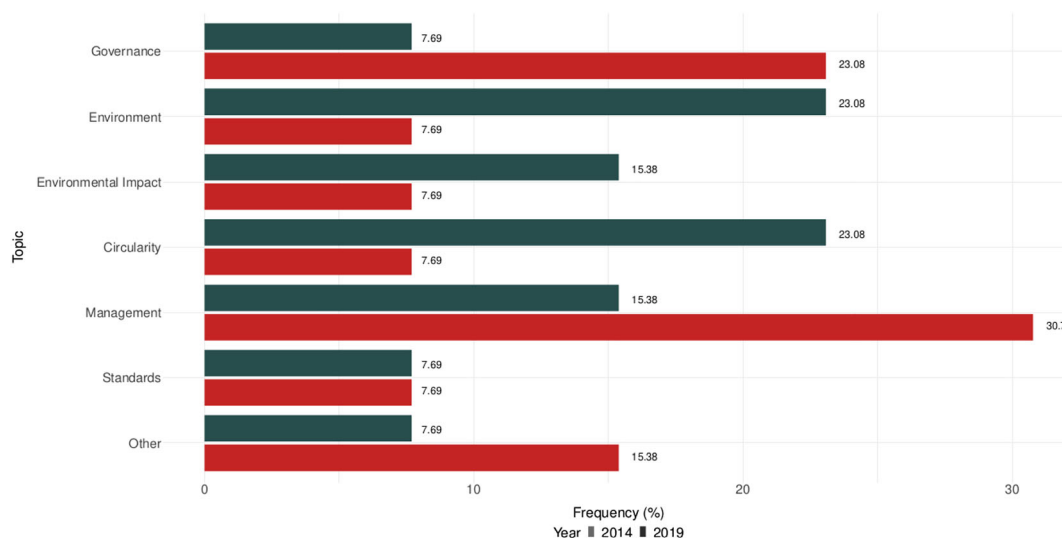


FIGURE 4 Topic modelling results [Colour figure can be viewed at wileyonlinelibrary.com]

- i. an increase of institutional pressure through new regulatory requirements carefully designed to deliver corporate as well as operational outcomes. Sustainability reports are often too lengthy and provide a substantial narrative section, which may be difficult to understand and may not conform with the expectations of stakeholders who want a clear and comprehensible document. Campbell and Slack (2011) explain that it is unlikely that sustainability reports will change substantially if pressure for change is predominantly applied to only one point of the reporting chain. Then the pressure for change should start requesting few but more quantitative environmental information.
- ii. an increase of stakeholder's pressure through consumers that became part of the change process. The clarity of information could be increased with the aim of improving stakeholder's decision making (Eccles & Krzus, 2010). Interest groups and regulators need to engage more widely to understand the sort of information that is desired by groups and stakeholders seeking to influence business activity.
- iii. providing education to some categories of stakeholders may increase their ability to increase the environmental contents of sustainability/CSR reports providing a positive association between environmental information, CSR activities and financial results an increase.

Our study aims at an advance in CE culture also through an increase of relevance of CEEI in CSR reports. It seems necessary to reduce the number of report guidelines available in the literature, which often generate a fragmented reporting framework based on several guidelines. It would be preferable to adopt an integrated approach based on both CSR/CEEI reporting. We agree that, as argued also by Bhimani and Soonawalla (2005), the development of a more comprehensive and integrated approach to social and environmental reporting is really desirable.

A limit of this study is related to the lack of an in-depth analysis of the social and economic impacts of the CE which will be the subject of future investigations. Moreover, a methodological limit of the content analysis of this study concern the sample size and the time of analysis (based on two years) which does not permit generalizing the results in the absence of a more extensive statistical analysis. Finally, further research could investigate CEEI disclosure in CSR reports through a wider international comparison, also refining the method to evaluate the CEEI quality profile and undertaking an analysis considering companies' dimensions. Also, qualitative studies could be interesting in understanding what kind of information consumers think to be important for a good disclosure of CEEI in CSR reports.

ACKNOWLEDGEMENT

Open Access Funding provided by Università degli Studi di Roma La Sapienza within the CRUI-CARE Agreement.

ORCID

Rosa Lombardi  <https://orcid.org/0000-0003-0470-231X>

REFERENCES

- Bhimani, A., & Soonawalla, K. (2005). From conformance to performance. The corporate responsibilities continuum. *Journal of Accounting and Public Policy*, 24(3), 165–174. <https://doi.org/10.1016/j.jaccpubpol.2005.03.001>
- Blacconiere, W. G., & Northcutt, W. D. (1997). Environmental Information and market reaction to environmental legislation. *Journal of Accounting, Auditing and Finance*, 12(2), 149–178. <https://doi.org/10.1177/0148558X9701200203>
- Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308–320. <https://doi.org/10.1080/21681015.2016.1172124>
- Bom, S., Jorge, J., Ribeiro, H. M., & Marto, J. (2019). A step forward on sustainability in the cosmetics industry: A review. *Journal of Cleaner Production*, 225, 270–290. <https://doi.org/10.1016/j.jclepro.2019.03.255>
- Campbell, D., & Slack, R. (2011). Environmental disclosure and environmental risk: sceptical attitudes of UK sell-side bank analysts. *The British Accounting Review*, 43(1), 54–64. <https://doi.org/10.1016/j.bar.2010.11.002>
- Cinquini, L., Tenucci, A., & Frey, M. (2012). Analyzing intellectual capital information in sustainability reports: Some empirical evidence. *Journal of Intellectual Capital*, 13(4), 531–561.
- EC. (2014a). Development of guidance on extended producer responsibility (EPR). http://ec.europa.eu/environment/waste/pdf/target_review/Guidance%20on%20EPR%20-%20Final%20Report.pdf
- EC. (2014b). Towards a circular economy: A zero waste programme for Europe. <http://ec.europa.eu/environment/circular-economy/pdf/circular-economy-communication.pdf>
- EC. (2015). Communication from the commission to the parliament, the council and the European economic and social committee and the committee of the regions: Closing the loop—An EU action plan for the Circular Economy. COM (2015) 614 final. European Commission
- EC. (2015b). Single market for green products initiative. <http://ec.europa.eu/environment/eussd/smgp/>
- Eccles, R. G., & Krzus, M. P. (2010). *One report: Integrated reporting for a sustainable strategy*. John Wiley and Sons.
- Elkington J. (1994). Enter the triple bottom line. Chapter 1. Available at: <https://www.johnelkington.com/archive/TBL-elkington-chapter.pdf>
- European Commission. (2001). Green paper: Promoting a European framework for corporate social responsibility. Commission of the European Communities. Available online: <https://doi.org/10.1017/CBO9781107415324.004> (accessed on 18 March 2020).
- Fortunati, S., Martiniello, L., & Morea, D. (2020). The strategic role of the corporate social responsibility and circular economy in the cosmetic industry. *Sustainability*, 2020(12), 5120. <https://doi.org/10.3390/su1212512020>
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The circular economy—A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>
- Gray, R. H., Kouchy, R., & Lavers, S. (1995). Constructing a research database of social and environmental reporting by UK companies: a methodological note. *Accounting, Auditing & Accountability Journal*, 8(2), 78–101. <https://doi.org/10.1108/09513579510086812>
- Haupt, M., & Hellweg, S. (2019). Measuring the environmental sustainability of a circular economy. *Environmental and Sustainability Indicators*, 1, 1–2. <https://doi.org/10.1016/j.indic.2019.100005>
- Jagarlamudi, R. (2012). Incorporating lexical priors into topic models. In *Proceedings of the 13th Conference of the European Chapter of the Association for Computational Linguistics* (pp. 204–213). Association for Computational Linguistics.
- Jivani, A. G. (2011). A comparative study of stemming algorithms. *International Journal of Computer Technology in Applications*, 2, 1930–1938.

- Khan, P. A., Johl, S. K., & Johl, S. K. (2021). Does adoption of ISO 56002-2019 and green innovation reporting enhance the firm sustainable development goal performance? An emerging paradigm. *Business Strategy and the Environment*, 1–15. <https://doi.org/10.1002/bse.2779>
- Krippendorff, K. (2004). *Content analysis: An introduction to its methodology* (2nd ed.). Sage Publications.
- Landau, A., Rochell, J., Klein, C., & Zwergel, C. (2020). Integrated reporting of environmental, social, and governance and financial data: Does the market value integrated reports? *Business Strategy and the Environment*, 29(4), 1750–1763.
- Leandro, A., & Paixao, S. (7 November 2018). Corporate social responsibility and circular economy: Two ways, same destinations? An outlook on both concepts and cases from Portugal. *Proceedings of the Congrès avniR*, Lille, Portugal, 1750, 1763.
- Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: A comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, 115(2016), 36–51. <https://doi.org/10.1016/j.jclepro.2015.12.042>
- McDonough, W. (2002). Design for the triple top line: New tools for sustainable commerce. *Corporate Environmental Strategy*, 9(3), 251–258. [https://doi.org/10.1016/S1066-7938\(02\)00069-6](https://doi.org/10.1016/S1066-7938(02)00069-6)
- Meinel, C., & von Thienen, J. (2016). Design thinking. *Informatik-Spektrum*, 39(4), 310–314. <https://doi.org/10.1007/s00287-016-0977-2>
- Moreno, M., De Los Rios, C., Rowe, Z., & Charnley, F. (2016). A conceptual framework for circular design. *Sustainability*, 8(9), 937. <https://doi.org/10.3390/su8090937>
- Morioka, S. N., Evans, S., & Monteiro de Carvalho, M. (2016). Sustainable business model innovation: exploring evidence in sustainability reports. *Procedia CIRP*, 40(2016), 659–667. <https://doi.org/10.1016/j.procir.2016.01.151>
- Murillo, V. B., Rodrigo, S., Do Prado, G. F., De Francisco, A. C., & Piekarski, C. M. (2020). Circular economy as a driver to sustainable businesses. *Cleaner Environmental Systems*, 2(2021), 100006.
- Nemtanu, M. (2012). Corporate social responsibility for cosmetics companies. Working Papers Series on Social Responsibility Ethics & Sustainable Business. 1, 33–34.
- Ness, B., Urbel-Piirsalu, E., Anderberg, S., & Olsson, L. (2007). Categorising tools for sustainability assessment. *Ecological Economics*, 60(3), 498–508. <https://doi.org/10.1016/j.ecolecon.2006.07.023>
- Niero, M., & Stewart, R. (2018). (2018), Circular economy in corporate sustainability strategies: A review of corporate sustainability reports in the fast-moving consumer goods sector. *Business Strategy and the Environment*, 27, 1005–1022. <https://doi.org/10.1002/bse.2048>
- Pascu, E., Nedea, P. S. (2013). Sustainable development through eco-design. Management Intercultural, Romanian Foundation for Business Intelligence, Editorial Department 29, 248–254.
- Predeville, S., & Bocken, N. (2017). Sustainable business models through service design. *Procedia Manufacturing*, 8, 292–299. <https://doi.org/10.1016/j.promfg.2017.02.037>
- Prieto-Sandoval, V., Jaca, C., & Ormazabal, M. (2018). Towards a consensus on the circular economy. *Journal of Cleaner Production*, 179, 605–615. <https://doi.org/10.1016/j.jclepro.2017.12.224>
- Ramani, K., Ramanujan, D., Bernstein, W. Z., Zhao, F., Sutherland, J., Handwerker, C., Choi, J. K., Kim, H., & Thurston, D. (2010). Integrated sustainable life cycle design: A review. *Journal of Mechanical Design*, 132(9), 091004. <https://doi.org/10.1115/1.4002308>
- Rexhepi, G., Kurtishi, S., & Bexheti, G. (2013). Corporate social responsibility (CSR) and innovation—The drivers of business growth? *Procedia - Social and Behavioral Sciences*, 75, 532–541. <https://doi.org/10.1016/j.sbspro.2013.04.058>
- Romli, A., Prickett, P., Setchi, R., & Soe, S. (2015). Integrated eco-design decision-making for sustainable product development. *International Journal of Production Research*, 53(2), 549–571. <https://doi.org/10.1080/00207543.2014.958593>
- Saidani, M., Yannou, B., Loroy, Y., Kluzel, F., & Kendall, A. (2019). A taxonomy of circular economy indicators. *Journal of Cleaner Production*, 207(2019), 542–559. <https://doi.org/10.1016/j.jclepro.2018.10.014>
- Steenkamp, N. (2007). “Intellectual capital reporting in New Zealand: Refining content analysis as a research method”, PhD dissertation thesis, Auckland University of Technology, Auckland.
- Weber, R. (Ed.) (1985). *Basic content analysis, quantitative applications in the social sciences*. Sage Publications.

How to cite this article: Tiscini, R., Martiniello, L., & Lombardi, R. (2022). Circular economy and environmental disclosure in sustainability reports: Empirical evidence in cosmetic companies. *Business Strategy and the Environment*, 31(3), 892–907. <https://doi.org/10.1002/bse.2924>

APPENDIX A: LIST OF COMPANIES

Company	report
L'Oreal	Integrated annual report + Progress
Johnson and Johnson	Health for Humanity - CSR Report
LVMH	CSR report
Amore Pacific	Sustainability Report
Clarin	CSR report
Shiseido	Sustainability Report
YVES ROCHER	CSR report
Chanel	CSR Report
DAVINES GROUP	Sustainability Report
Beiersdorf Consumer	Sustainability Report
KAO	Sustainability Report
Este Lauder	Sustainability Report
Innospect	CSR report

APPENDIX B: LIST OF REMOVED PAGES

Reports 2019

Amorepacific: 1,2,3,4,5,6,9,25,30,31,37,38,45,59,62,63,64,65
 Beiersdorf: 1,3,7,8,9,70,71,72,73,85,86,87,122,141,144,145
 Chanel: 1,2,6,7,8,10,12,16,18,22,24,26,30,32,34,38,44,48,50,56,66,68,75,76
 Clarins: 1,2,3,16
 Davines: 1,2,3,6,8,33,34
 ELC: 1,2,75,76,77,78
 Innospec: 1,4,26,36
 JNJ: 1,2,4,11,67,76,77,123,124,135,136,144,145,146
 Kao: 1,2,3,4,17,18,75,116,166,167,175,225
 Loreal: 1,2,5,9,10,11,20,21,24,25,26,27,28,32,33,36,37,38,42,46,50,54,55,66,67,68
 LVMH: 1,2,4,5,6,15,22,31,38,40,47,51,52,53,54
 Shiseido: 1,14,15
 Yves Rocher: 1,3,4,16

Reports 2014

Amorepacific: 1,2,3,7,9,10,11,12,13,14,18,22,49,61,62,63
 Beiersdorf: 1,2,5,14,25,34
 Chanel: 1,2,3,6,12,13,17,21,25,29,33,38,47,48,49,50,51
 Clarins: 1,2,4,8,12,47,63
 Davines: 1,5,8,11,24,25
 ELC: 1,2,3,6,7,14,21,30,35,38,50,57,64
 Innospec: 1,17

JNJ: 1,2,10,65

Kao: 1,2,3,4,8,88,125,162,165,177

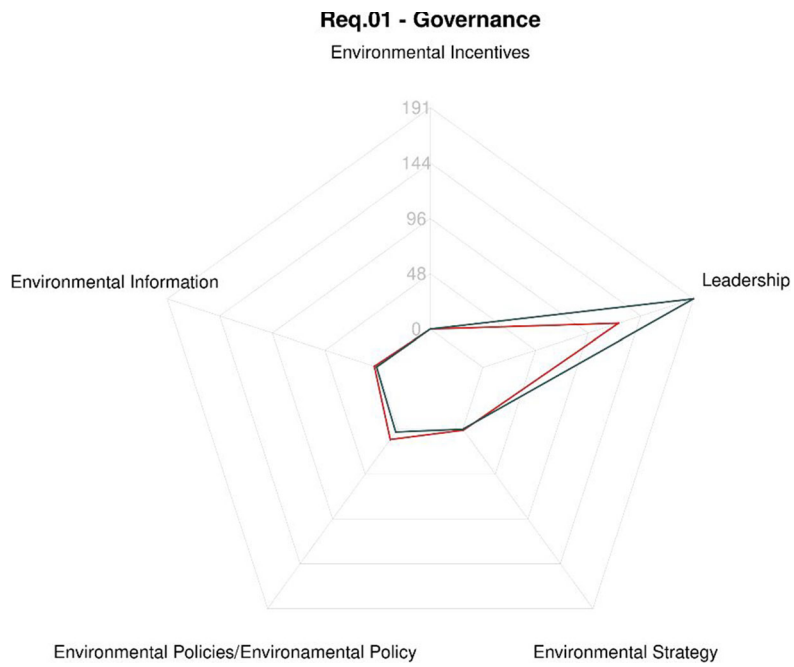
Loreal: 1,2,3,9,11,20,21,42,43,60

LVMH: 1,2,3,4,17,18,24,29,30,37,38,46,48,49,50

Shiseido: 1,2,55,61,62,63,64,65,66,67,161,162,163,164,165,166,167,168,169,170,171,17,173,174,175,176,177,178

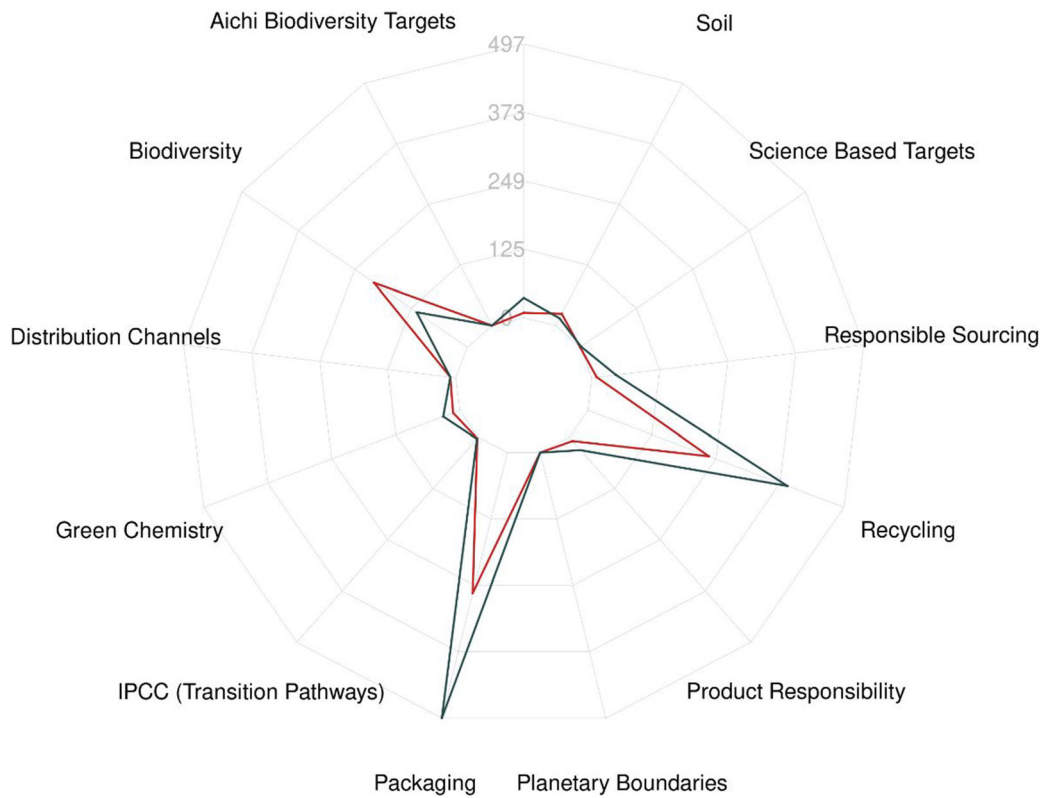
Yves Rocher: 1,2

APPENDIX C: SPIDER PLOTS

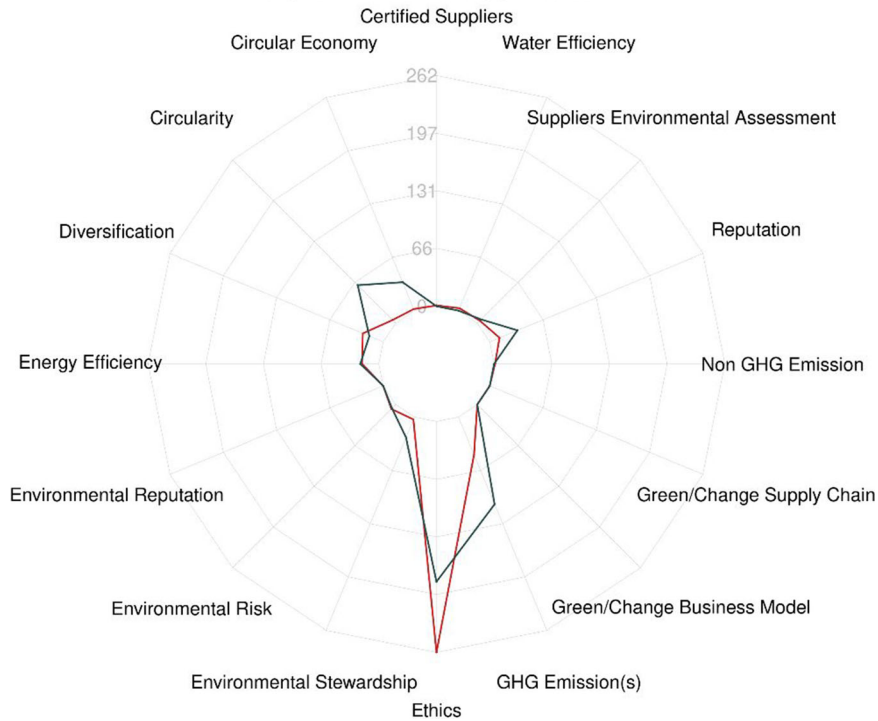


Req.02 - Management's Environmental Policies, Strategies and Targets

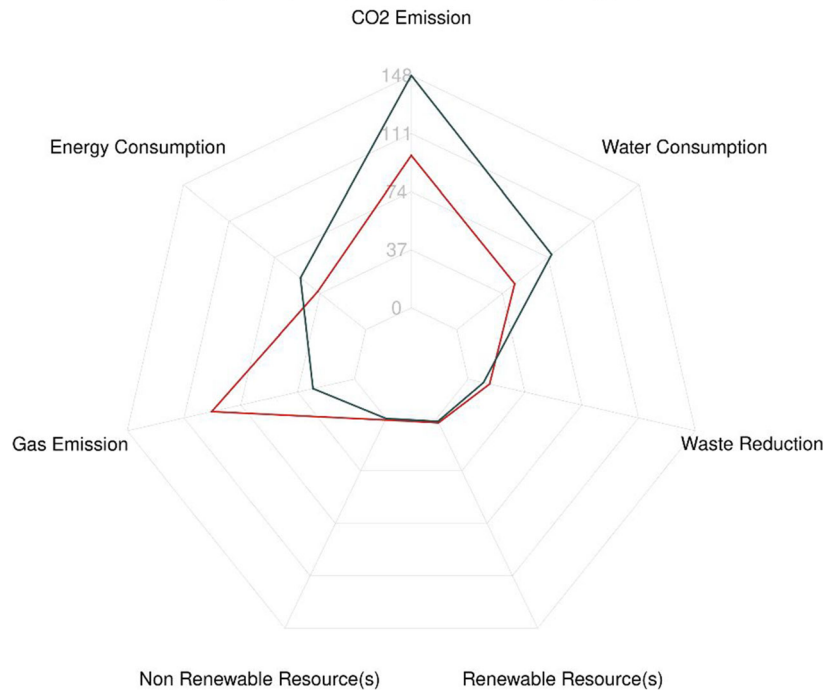
(UN) Sustainable Development Goals



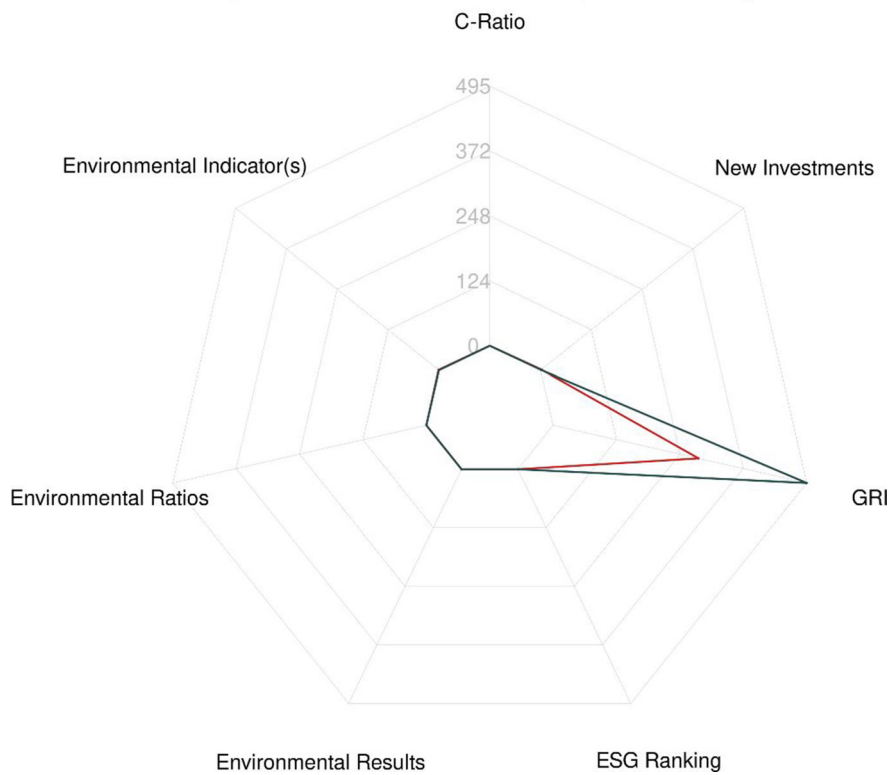
Req.03 - Risks and Opportunities



Req.04 - Source of Environmental Impact

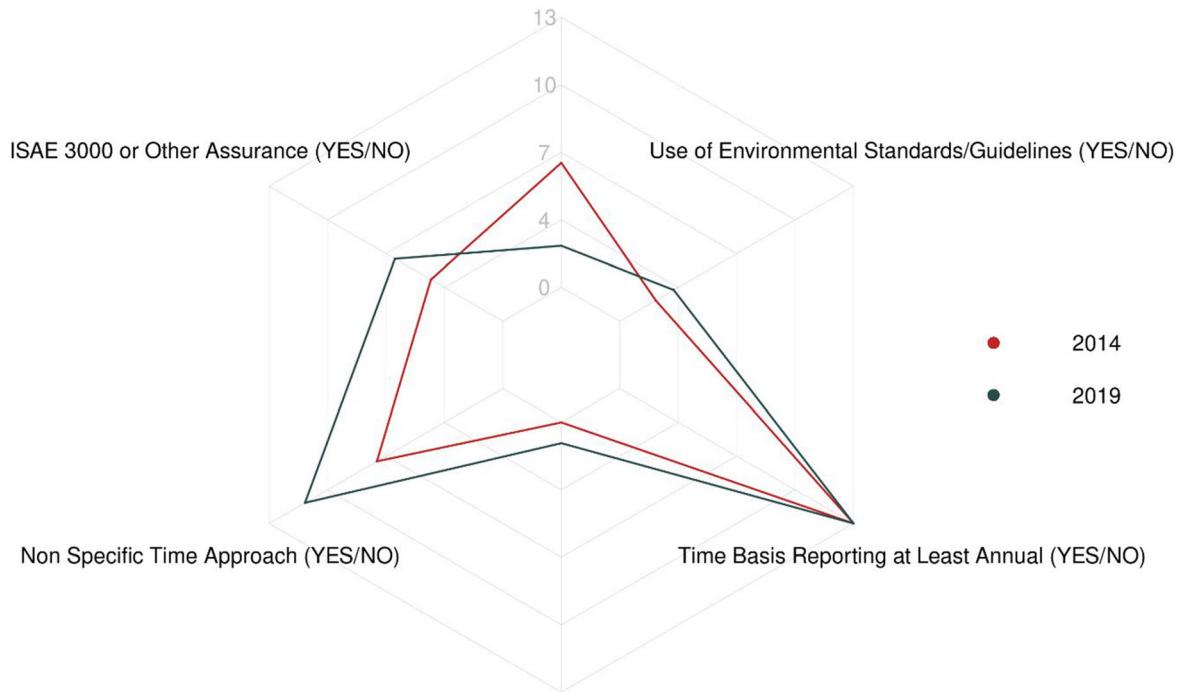


Req.05 - Performance and Comparative Analysis



Req.06-12 Reporting

Forward Looking Approach (YES/NO)



Presence of a Summary in the Environmental Impact of the Organization (YES/NO)