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L'Oréal's sustainability strategies: Text mining of environmental disclosures in the cosmetics industry

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Abstract

***Research question*:** How does L'Oréal create and communicate its environmental sustainability in public reports?
***Motivation*:** Sustainability in the cosmetics industry has been widely examined from technical perspectives, including ingredients, green chemistry, raw materials and life-cycle impacts, there is not much attention that has been given to how companies publicly frame environmental responsibility and translate these concerns into corporate strategy and reporting.
***Idea*:** This study examines the evolution of L'Oréal's environmental sustainability discourse and its relationship with the United Nations Sustainable Development Goals (SDGs), focusing on SDGs 12, 13, 14 and 15. The analysis considers whether changes in sustainability communication reflect a shift from explicit SDG-oriented objectives towards a reporting focused on governance and risks.
***Data*:** The study analyzes L'Oréal's annual reports, Universal Registration Documents, and due diligence for 2020–2024, complemented by financial and sustainability indicators from the LSEG Refinitiv Eikon database, including revenue, gross margin, environmental pillar scores and SDG reporting status.
***Tools*:** A mixed-methods approach was used, combining quantitative analysis with qualitative text mining. Using R Studio and the TidyText package, word frequencies, bigrams

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and trigrams were analyzed after extracting environment-related disclosures. Excel was used to examine financial and environmental performance trends.
***Findings*:** The results show a gradual transformation of L'Oréal's environmental discourse from relatively broad environmental and product-oriented themes towards organizational responsibility, risk management, performance evaluation, supply-chain governance and executive oversight. Suppliers become particularly prominent in 2024, indicating an increasing value-chain perspective. At the same time, explicit SDG references decline; environmental themes are directly linked to SDGs in 2020–2021, mentioned without explicit links in 2022–2023, and no SDG specification is identified in 2024. This does not indicate the disappearance of environmental responsibility, but rather a change in how it is framed and communicated.
***Contribution*:** The study contributes to sustainability reporting research by providing a longitudinal company-level analysis of how environmental responsibility is constructed through corporate discourse. It connects text-mining evidence with the evolution of SDG visibility and the governance-oriented logic of contemporary sustainability reporting, offering insights for understanding corporate accountability, transparency and communication of environmental responsibility in the cosmetics industry.

Keywords: sustainability reporting, sustainable development goals (SDGs), cosmetic industry, corporate discourse

JEL codes: Q56, M14

1. Introduction

The impacts generated by the production of manufactured goods extend across the entire product life cycle: from product design, ingredient selection, manufacturing, packaging, transportation and distribution, to retail, usage and ultimately, disposal (Martins & Marto, 2023). The impacts described represent any of the three dimensions of environment, social and economic pillars (Bom *et al.*, 2019).

The concept of sustainability further evolved beyond its origin definition of "meeting the needs of current generations without compromising the future generation to meet their own needs" (United Nations, 1987) to include environmental, social and economic impacts of individuals, companies and institutions (Ong *et al.*, 2024). These dimensions build the three-pillar model of sustainability (Martins & Marto, 2023; Purvis *et al.*, 2019; Elkington, 2004). Sustainability reporting provides companies with a framework of communicating their commitments, identifying and anticipating risks, and establishing measurable objectives for future action. By disclosing sustainability targets and related performance information, companies can demonstrate how sustainability considerations are incorporated into their activities and decision-making processes.

The cosmetics industry is transforming (Zielińska-Chmielewska *et al.*, 2025), as a response to consumer's behavioral changes, and observes an increased emphasis on sustainability, transparency, and eco-friendliness (Hazra *et al.*, 2024). The cosmetics industry has reached a peak point (Alviri *et al.*, 2025) where the concerns related to environmental impacts of cosmetics are significant regarding deforestation, overexploitation of minerals, emissions of greenhouse gases, and the release of pollutants into the environment (Bom *et al.*, 2020; Cinelli *et al.*, 2019), as well as pollution coming from unrecyclable packaging materials. Mirroring the business models observed in the apparel industry, "fast beauty" (Alviri *et al.*, 2025) promotes low-cost cosmetics with a high return due to low-costs.

Although sustainability in the cosmetics industry has attracted researchers' attention, previous work has mostly reviewed technical and scientific discourses on ingredients and technology development (Pangestuti *et al.*, 2021; Liu *et al.*, 2019), raw materials and the circular economy (Panwar *et al*., 2021; Lourenço-Lopes *et al.*, 2020), green chemistry (Jiang *et al.*, 2021), or the environmental harms associated with sourcing and product formulations (Tkaczyk *et al.*, 2020). What remains underexplored is how businesses publicly address these challenges. We propose an analysis of corporate discourse, showing how the case company translates scientific and supply-chain concerns into strategy, reporting and measurable commitments, and how it addresses the post-use phase outside direct control. This research gap is critical as corporate discourse plays a key role in shaping stakeholder perceptions, accountability and sustainability governance.

The study pursues the following objectives: (1) identifying key sustainability themes in the cosmetics industry's corporate reporting, (2) analyzing how these themes are structured, prioritized and interconnected within corporate discourse using text-mining techniques, and (3) assessing the relation with the mentioned Sustainable Development Goals (SDGs). The following section represents the literature review: discussing the industry context and the hot spots of the industry, as well as understanding the SDGs from the industry's perspective. The methodology of the paper is presented in Section 3, followed by the results of L'Oréal's case study. Contributions to knowledge and implications for regulators are presented.

2. Literature review

Cosmetic products are defined by the European Commission as "any substance or mixture intended to be placed in contact with the external parts of the human body […] or with the teeth and the mucous membranes of the oral cavity […] cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odors" (European Commission, 2015). Raw materials are central to industry sustainability, and they are often marketed as natural/organic. Although these categories differ, they are frequently grouped under

the "sustainable" umbrella when they reflect ethical, social and environmental responsibility, benefiting both the consumer and the planet (Amberg & Fogarassy, 2019; Rachita Kapoor *et al.*, 2019). Sustainability should be embedded from the design phase onward.

Demand for natural cosmetics continues to rise in Europe and it is expected to grow further (Statista, 2025), increasing researchers' interest (Rocca *et al.*, 2022). However, sustainability in cosmetics extends beyond natural or organic ingredients, encompassing broader environmental and social dimensions. The cosmetics industry is configured as described below (Rocca *et al.*, 2023):

- Upstream activities: extraction, transport, refinement of raw materials, generation of electricity, production of auxiliary products, manufacturing of packaging.
- Core activities: transport of raw materials and packaging from suppliers to the main manufacturer of cosmetics, manufacturing cosmetic products, storage, cleaning and waste management, and the generation of electricity/production of fuels.
- Downstream activities: transportation to warehouses, consumer use (rinse-off), end-of-life processes of product/packaging.

Preserving natural resources has become central to sustainability discourse (Perret *et al.*, 2025) due to the fast environmental deterioration (Biswas & Roy, 2015). The cosmetic industry is forced to consider alternatives for ingredients as a response to green consumerism (Bom *et al.*, 2019). SDG 12 makes *Responsible Production and Consumption* especially relevant, requiring prevention, reduction, recycling and reuse across the value chain. Key challenges include microplastics found in exfoliants and other products which persist in the environment, as well as unsustainable sourcing of ingredients such as palm oil (Russell, 2020) and mica, linked to deforestation and other environmental harms.

Water is a key concern under SDG 14 *Life below Water* both as a natural resource and as a pathway for marine pollution. Water is present throughout the cosmetic product life cycle, as the main formulation ingredient. Some of the observed sustainable strategies for reducing water consumption (Bom *et al.*, 2019) may include use of different water sources, recycling and reusing production water, rainwater harvesting, waterless products, optimization of production and cleaning processes, or treatment and reuse of water (Martins & Marto, 2023). These strategies were observed in L'Oréal, Givaudan, Burt's Bees, Aveda and Amore Pacific (Bom *et al.*, 2019). Beyond water, biodiversity impacts linked to plant and animal-derived ingredients fall under SDG 15 *Life on Land* (Bom *et al.*, 2019), with palm oil being a well-known example due to its ties to deforestation, species loss and climate impacts (Vijay *et al.*, 2016). Assessing the environmental footprint of other ingredients, including their sourcing and processing, remains an urgent need (Abrar *et al.*, 2025).

Energy use and waste management are the next major topic (Fischer & Huber, 2025). Companies increasingly adopt efficient technologies to cut water and energy consumption, emissions and waste, with many large brands such as L'Oréal, Aveda, Burt's Bees, Biolage, Shiseido and Lush shifting toward renewable energy and energy-efficient equipment (Martins & Marto, 2023). Distribution adds further challenges, as fossil fuel transport significantly increases carbon footprint, directly linking this stage to SDG 13 *Climate Action* and the need to reduce emissions across all transport activities, from raw materials to post-use logistics (Suphasomboon & Vassanadumrongdee, 2023).

In the consumer phase, companies should consider multiple social variables including habits and lifestyle, the type of product (rinse-off or leave-on), the amount, and frequency of use. The impact of this phase is highly dependent on the first phase, the design phase (Bom *et al.*, 2019), as well as the education provided to consumers. In this phase it is important to consider if the product goes down the drain as it may affect aquatic environment if non-sustainable ingredients are present (De *et al.*, 2023; Anagnosti *et al.*, 2021; Rochman *et al.*, 2015).

The last phase, post-use phase, considers the function of packaging a key element in the sustainability of cosmetic products, therefore initiatives such as Sustainable Packaging Initiative for Cosmetics (SPICE) represent a key partnership between cosmetics companies and suppliers that aim to create methods and tools for more sustainable packaging in the industry. As plastic packaging is resistant and flexible, as well as cost-effective, it is still preferable in the industry, yet represents the number one enemy of the environment, polluting ecosystems, both land and marine, and threatening biodiversity (Cinelli *et al.*, 2019; Wakefield-Rann, 2017). Even in this case, there are multiple global initiatives to decrease plastic, one of them being The Ellen MacArthur Foundation and the Alliance to End Plastic Waste.

The post-use phase is the final phase of the product life cycle and determines the extent to which materials can be reintegrated into productive loops rather than becoming waste. To create better sustainable business strategies, companies must follow circular economy principles (Sonkusare & Shastri, 2025) such as: *reducing* the amount of packaging, *reusing* by refilling the packaging, and *recycling* the packaging after use. Strengthening such practices not only decreases raw material overextraction and decreases waste generation but also supports the transition to a closed-loop economy in which materials keep their value for as long as possible in their value chain and enhance the environmental performance of companies.

Sustainability has become a central concern throughout the whole value chain of the cosmetics industry, yet little is known about how companies publicly frame their responsibilities and solutions. Therefore, this study examines the corporate discourse of the largest cosmetics company on environmental matters in order to understand

the main reporting themes and how industry players construct and communicate their sustainability narrative. Accordingly, the research question followed throughout the study is: *How does the largest cosmetics company construct and communicate its environmental sustainability responsibilities in public reporting?*

3. Methodology

The paper aims to reveal sustainability themes as outputs of company strategy and observe the areas that the corporate discourse addresses. The findings contribute to a company-level perspective that links technical details with analyses of corporate accountability and stakeholder communication. The current paper employs a mixed-methods approach that integrates

L'Oreal was chosen for the case study, as it represents one of the leaders in the industry, based on revenue of 434 million EUR, followed by Shiseido and Coty. The text sources analyzed consist of Annual report 2020, L'Oreal for the future, Universal Registration Document 2020, Annual report 2021, Universal Registration Document 2021, Annual Report 2022, L'oreal Vigilance plan 2022, Annual report 2023, Universal Registration Document 2023, L'Oreal Vigilance plan 2023, Annual report 2024, Universal Registration Document 2024, L'Oreal Vigilance plan 2024. To extract relevant content, the search term "environm*" was used. This approach allows for the inclusion of multiple lexical variations (e.g., "environment", "environmental"), thereby ensuring comprehensive coverage of environment-related discourse while avoiding the omission of relevant passages due to minor linguistic differences.

The "TidyText" version 0.4.2 (Silge *et al.*, 2016) package in R Studio (version 2024.12 and R version 4.4.2) was used for text mining together with data analysis methods providing insights on facts that could not be simply concluded on a reading basis (Ben-Dov & Feldman, 2009). In order to get suitable results and to prevent artificial inflation of term frequency, multiple processes took place such as: filtering out the stop-words, numbers and other words that were considered meaningless for the analysis, as previously mentioned the search word "environm*", generic and high-frequency terms such as "environmental" and "sustainability" were also removed, as their presence limits their analytical value in distinguishing specific thematic priorities. Additional exclusions included the company name (to avoid overrepresentation due to repetition) and terms such as "human" and "rights", which are more closely associated with the social dimensions of sustainability and fall outside the primary environmental focus of this study. These decisions were made to enhance the specificity and interpretability of the results by reducing noise and emphasizing substantively meaningful variance.

Financial data of L'Oreal was extracted in December 2025, from the Refinitiv Eikon platform. The data collected refers to the financial years 2020-2024 and it represents company details such as revenue, total assets, gross margin, CSR strategy score which were used for contextual screening criteria, as well as the reporting status of all 17 SDGs, indicating whether the company does or does not report on the UN Goals, in order to create an understanding of the reporting of SDGs in public discourse.

4. Results and discussions

The story of L'Oréal starts in 1909, when a French chemist has developed a hair dye and called it l'Auréale. L'Oréal is a French company, with 43.48 billion EUR in sales, proving a great presence on the market. To achieve its strategy, the company has a Research & Innovation network of hubs present in each strategic market, which further can be rolled out to other areas of the world thanks to L'Oréal's "Universalization". The company was recognized as a leader by the United Nations in 2018 (L'Oréal, 2018) for the program "L'Oréal For The Future – Sustainability Commitments for 2030" in which the company defined clear objectives around climate change, water consumption and respect of biodiversity.

4.1 Analysis of financial and sustainability information from LSEG

The financial and sustainability indicators for the period 2020-2024 reveal a pattern of economic expansion and gradual improvements in environmental performance. Based on revenue (Figure 1) and gross margin – GM (Figure 2), we can conclude that the company demonstrates stability in a strong market demand. The environmental pillar score follows a similar positive trajectory, increasing from 74.55 in 2020 to 82.05 (out of 100) in 2024, with a minor decrease in 2023. This improvement signals the strengthened environmental governance, enhanced reporting practices and progress towards water stewardship and emissions reduction.

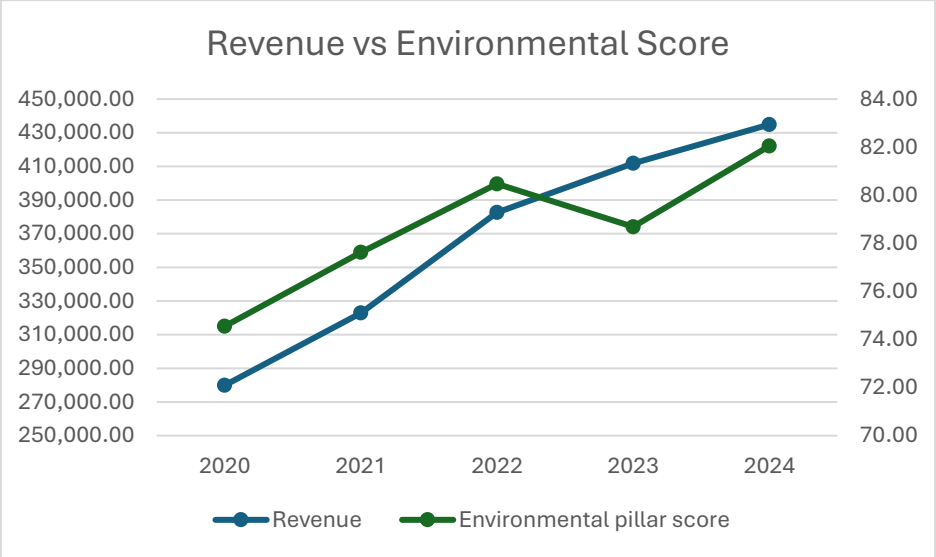


Figure 1. Revenue versus environmental score
Source: Authors' research, generated with Excel

When considered together, the two graphs indicate that the company's financial development is correlated with environmental performance. Both revenue and the environmental pillar score exhibit upward trajectories. The parallel progress of these indicators may further imply that investments in environmental initiatives contribute to long-term competitiveness, brand equity, and stakeholder confidence.

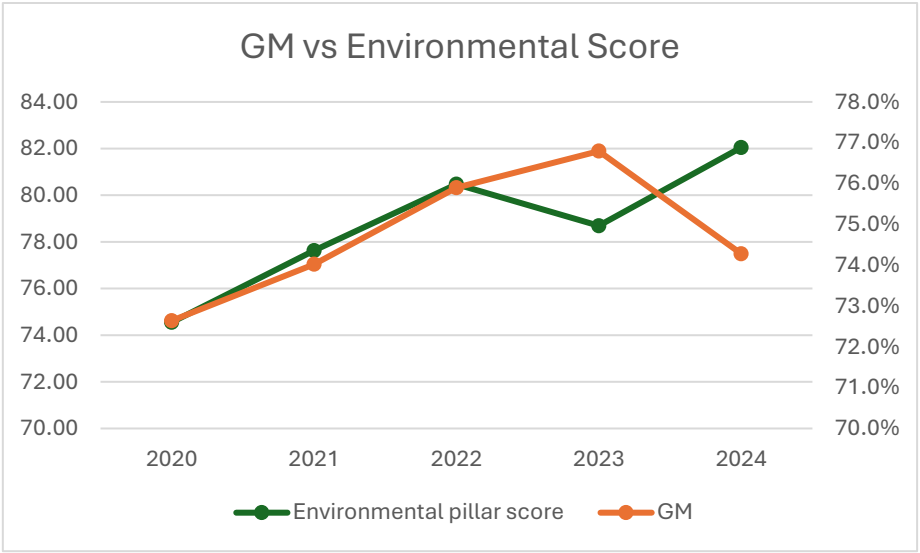


Figure 2. GM versus environmental score
Source: Authors' research, generated with Excel

At the same time, the contrast between the relatively stable gross margin and the more pronounced improvement in environmental scores suggests that enhancements in environmental performance do not translate immediately into profitability gains. This pattern aligns with the broader understanding that sustainability transitions often require substantial upfront investments, with financial returns materializing over extended time horizons. Overall, the combined financial and sustainability trends indicate that L'Oréal is strengthening its environmental performance while maintaining its economic resources, reinforcing its position as a leading actor in both market performance and sustainability governance.

4.2 Keyword frequencies identified in L'Oréal's report

The sampled material consists of 228,693 characters for 2020, 190,915 characters for 2021, 192,052 characters for 2022, 192,561 characters for 2023 and 196,648 characters for 2024. First understanding of how L'Oréal creates the environmental reporting base is observed through the single word frequency from the text retrieved for the reporting year of 2024, as presented in Figure 3. The x-axis which is labeled as "n" indicates the count of each word, while y-axis represents the words themselves. We took into consideration the first 10 words, by frequency.

The word frequency analysis (Figure 3) in L'Oréal's reporting from 2020 to 2024 reveals how environmental discourse is framed within broader governance and social narratives, rather than remaining focused on a stable set of environmental impacts. The discourse increasingly shifts toward organizational responsibility, supply-chain governance, risk management and measurable performance. While there is no specific environmental theme, the terminology of environmental responsibility is articulated mainly under the "health and safety" umbrella.

Social word's frequency is notable because the paragraphs were selected through the "environmen*" search term. This keyword was the most used between 2020-2022 and the second most used in 2023 and 2024. The presence of the keyword demonstrates that even when the discourse is centered on environmental aspects, the issues are not isolated to ecological matters, but the company integrates the whole socio-environmental framing, aligned with a strategic perspective where environmental action is validated through its social legitimacy (Deegan, 2002). In 2021, the term *social* became associated with words such as *safety*, *suppliers*, *risks*, *sustainable*, *sites* and *health*, representing a change from the 2020 disclosure towards a discourse organized around risk management and control. There is an observable increase in the frequency of the keyword *risks*, considering that environmental issues are treated as risks that need to be identified and managed. This corresponds with the broader institutionalization of ESG reporting, where environmental issues have increasingly become connected to corporate risk management, governance and strategic decision-making (Aguiar, 2026).

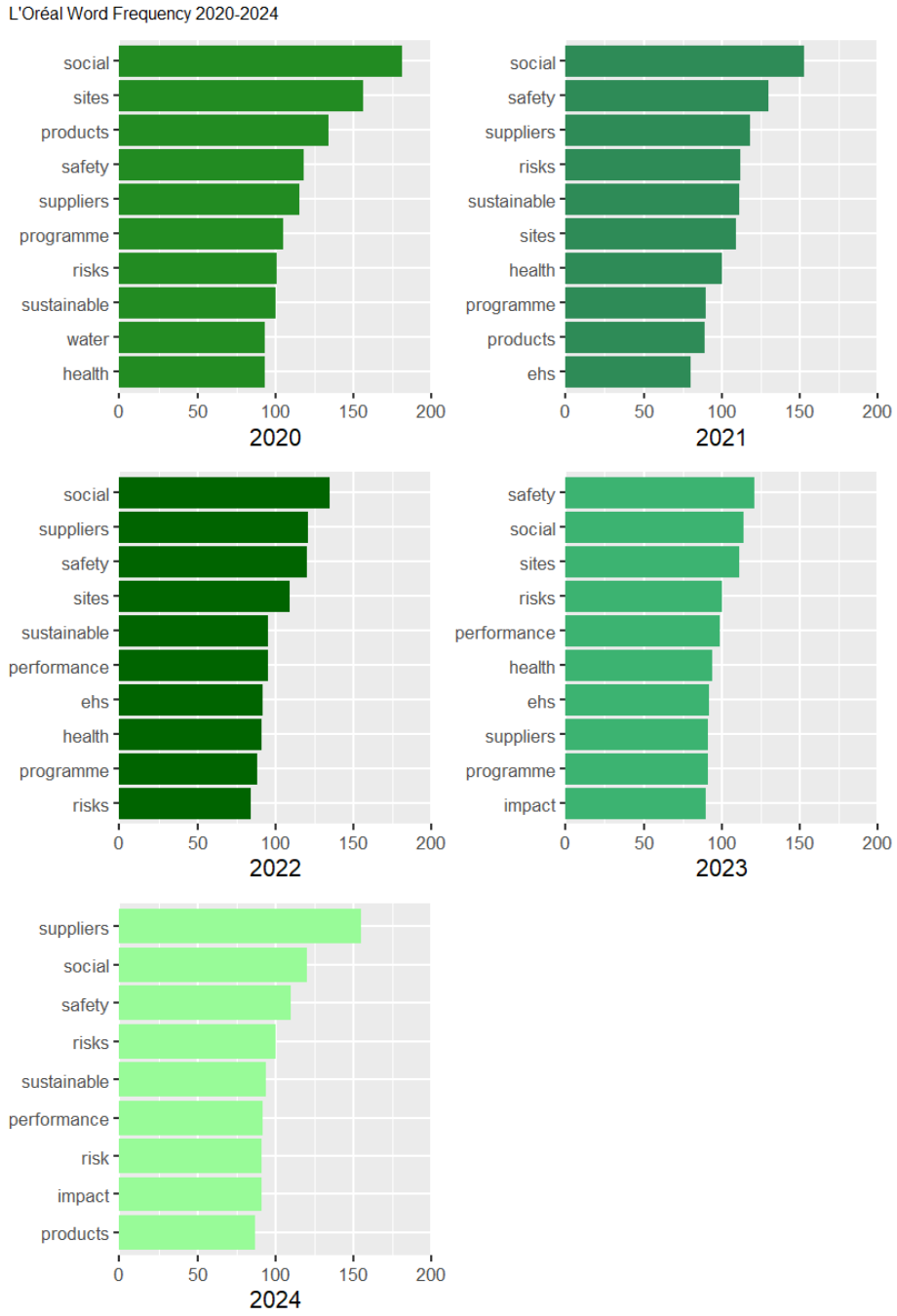


Figure 3. Word frequency in L'Oréal's sustainability reporting of 2020-2024
Source: Authors' research, generated with R Studio.

The prominence of *sites* and *products* also indicates that environmental responsibility is framed in two areas over which L'Oréal has direct influence: its operational facilities and its products. This is consistent with the environmental impacts of the cosmetics sector, where production sites, formulation, packaging, water consumption and resource use represent important sustainability concerns encompassing the risks around climate change, waste, water scarcity, biodiversity loss, and water and air pollution (Lim & Kwon, 2023).

Suppliers are also present in the company's discourse. This keyword is the most frequent in 2024. In the environmental context, this may highlight a shift towards Scope 3 emissions, value chain oversight and sustainable sourcing. This supports the interpretation that supply-chain discourse often serves as a legitimizing narrative by projecting control over the external actors, obscuring areas where the influence is limited (Thakur-Weigold & Miroudot, 2024). This is relevant for L'Oréal because many environmental impacts are associated with externally sourced raw materials, ingredients, packaging and logistics. Rather than presenting environmental responsibility only as an internal matter, the discourse increasingly constructs the company as a pillar of environmental performance across its network of suppliers. This is particularly visible in 2022, when the keyword *suppliers* was frequently used along words such as *safety*, *sites*, *sustainable*, *performance* and *EHS*. The presence of the word *performance* is important because it suggests a movement from describing environmental responsibility towards evaluating it. Similarly, the presence of EHS (Environment, Health and Safety) indicates that environmental concerns are treated at the management level rather than exclusively as voluntary initiatives, being supported by CSRD and ESRS (Dragomir *et al.*, 2026).

The year 2023 shows another notable shift, as *safety* becomes the most frequent term, while *performance* and *impact* gain more visibility in the company's discourse. This change represents a shift from broad sustainability claims toward a more managerial and performance-oriented environmental discourse. The increase in frequency in the word *impact* frames the issue in terms of what the company's activities represent for the environment and stakeholders. The presence of both *impact* and *risk* suggests that the company's discourse incorporates two definitions of environmental issues, first as external impacts generated by the company and risks that require management action. These keywords represent two perspectives, which can be linked to the concept of double materiality (Mezzanotte, 2023) introduced by the CSRD (European Union, 2022) and further developed through the ESRS. The first perspective represents the impact that refers to the environmental effects generated by the company's activities, while the second perspective presents the environmental issues as having an impact on performance. The two approaches are consistent with the ESRS approach to impacts, risks and opportunities and reflect the connection between impact and financial materiality in sustainability reporting (Dragomir *et al.*, 2025).

In 2024, the keyword *suppliers* became one of the most frequent words, appearing more often than any other word. This rise represents a substantial change in the structure of the company's discourse. Environmental responsibility is constructed as a value-chain governance matter. This is consistent with L'Oréal's more recent sustainability reporting, as the environmental reporting revolves around sustainable water management, GHG emissions reduction, traceable and sustainable raw materials, environmental and social evaluation criteria, audits and supplier monitoring. Environmental and social criteria are incorporated into supplier evaluation, while supplier-related sustainability indicators are monitored at the Group level (L'Oreal, 2024).

The word frequencies suggest that environmental responsibility is linked to multiple pillars. L'Oréal presents itself not only as an organization that must reduce its own environmental footprint, but as an actor capable of influencing environmental performance throughout its supply network. This is particularly important considering supply-chain sustainability literature which emphasizes that contemporary supply-chain requires companies to consider risks and performance across the wider supply system rather than concentrating exclusively on their own operations (Thakur-Weigold & Miroudot, 2024).

4.3 Bigram network analysis of sustainability discourse in L'Oréal's report

Figure 4 adds an increased dimension to the frequency analysis because it provides insights on how the terms are associated with one another within the selected paragraphs, rather than simply observing their frequency. Across the period 2020-2024, there are different stable clusters that can be observed, particularly around *raw materials*, *climate change policies* and *EHS*, *suppliers* and *sourcing*, *operational sites* and *distribution centres* and *future-oriented programmes* and *actions*.

In 2020, the network appears dispersed with several distinct thematic groups, suggesting that environmental responsibility was constructed around key themes such as product innovation and operational life cycle. Environmental concerns might be related to the *raw materials* that enter manufacturing, production sites, how products are being distributed, and research and development activities. This is consistent with literature on sustainability in the cosmetics industry, which emphasizes that environmental impacts occur throughout the product life cycle, from raw material extraction and formulation to packaging, transportation, use and disposal (Lim & Kwon, 2023; Bom *et al.*, 2019).



Figure 4. Words bigram in L'Oréal sustainability reporting of 2020-2024
Source: Authors' research, generated with R Studio.

The year 2021 presents a stronger integration of the environmental responsibility through word chains such as *renewable-raw-materials* and *development-sustainable-sourcing*. Compared to 2020, the environmental discourse becomes more specific on these two themes, being an interest point for the cosmetics industry

as raw materials sourcing is one of the most complex stages of the entire cosmetics value chain (Rocca *et al.*, 2022). Other themes refer to bigrams such as *risks-related*, *rules-applicable* and *policy-EHS*, suggesting an increase of the frameworks related to environmental management and responsibility through policies, risk identification and EHS systems, highlighting the transition from the focus on environmental characteristics of products toward the organizational systems that can sustain those attributes.

The year 2022 strengthens the themes present in the previous year, with bigrams such as *EHS-policy*, *applicable-rules*, *raw-materials*, *safety-health*, *strategic-suppliers* and a new perspective over the theme of *financial-performance*. The new theme *financial-performance* suggests that environmental performance is connected to operational performance, as evidence of the increased integration of ESG considerations. Another change is represented by the bigram *strategic-suppliers*, supporting previous findings regarding the importance of suppliers. The simultaneous presence of *climate-change* and *action-plan* connects climate change with organizational action, the discourse shifting from recognizing the environmental risks to describing mechanisms for responding to them.

The year 2023 further consolidates the governance-oriented behavior of the company through themes such as *climate-change*, *action-plans*, and *financial-performance* which occupy a central position in the network. Therefore, the network can sustain three levels of corporate environmental responsibility:

a) The main environmental problem: climate change;
b) The organizational response: action plans and programmes;
c) The organizational baseline: policies, EHS systems, manufacturing sites and distribution centers.

The last year of the analysis maintains the previous themes, with a focus on raw materials. *Palm-oil* represents a theme that appears in 2024, narrowing the environmental discourse to one specific raw material, subject to sourcing issues (Ngan *et al.*, 2022). Palm oil sourcing is associated with environmental concerns such as deforestation, biodiversity and land-use change, as well as social concerns. The appearance of the bigram *executive-committee* provides a new theme. Environmental issues appear to require executive oversight in the organizational hierarchy.

4.4 Trigram network analysis of sustainability discourse in L'Oréal's report

Figure 5 represents the last dimension of the analysis by observing multi-word expressions in the company's reporting and how specific concepts are constructed together across the period.

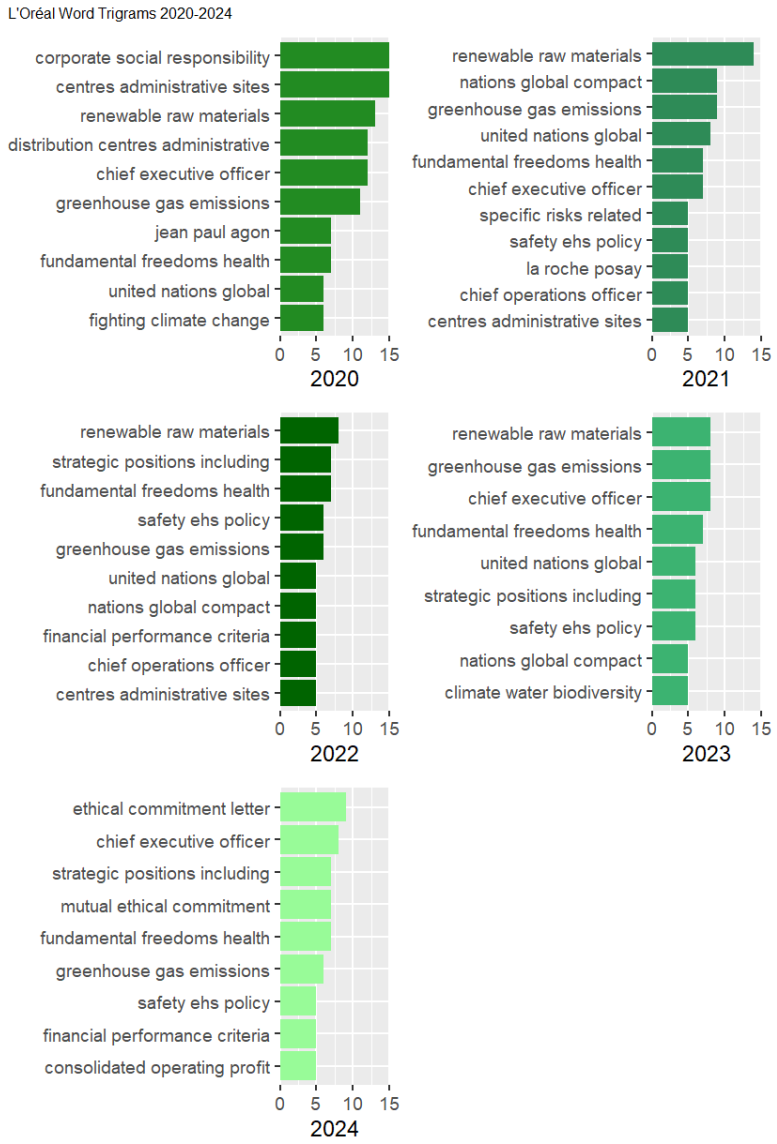


Figure 5. Word trigram in L'Oréal sustainability reporting of 2020-2024
Source: Authors' research, generated with R Studio.

The panels reveal a gradual transformation in the company's discourse. The concept of *renewable-raw-materials* appears as the top priority, sustaining the focus on sustainable supply chains and product formulation. Furthermore, the recurrent presence of *greenhouse-gas-emissions* and the addition of *climate-water-biodiversity* reframe the environmental discourse to encapsulate broader environmental issues. Themes such as *fundamental-freedoms-health*, *safety-EHS-*

policy, *ethical-commitment-letter* highlight the internal governance and risk management structure, suggesting safeguarding human rights and workplace safety. The presence of *united-nations-global* and *nations-global-compact* demonstrates the alignment with sustainability frameworks, with oversight by higher positions such as *chief-executive-officer*, *chief-operations-officer*, and *chief-operations-officer*.

4.5 The analysis of SDGs 12, 13, 14 and 15 in L'Oréal

Considering the discourse around SDGs 12, 13, 14 and 15, the company links certain themes to the SDGs as presented in Table 1. The themes are linked in the 2020 and 2021 Universal Documents, while in 2022 and 2023 the abbreviation "SDG" is only mentioned with no link. In 2024 there is no specification of SDG in any form.

Table 1. Themes linked to SDGs in 2020-2021.

	Themes that were linked to the SDGs
SDG 12	Circular economy
	Fight against food waste
	Means devoted to prevention of environmental risks and pollution
	Measures to prevent, recycle, reuse, other forms of recovery and waste elimination
	Raw material consumption and measures taken to improve efficiency in their use
	Soil use
SDG 13	Means devoted to prevention of environmental risks and pollution
	Adaptation to the consequences of climate change
	Measures taken to preserve or develop biodiversity
SDG 14	Respect for animal welfare
	Means devoted to prevention of environmental risks and pollution
	Measures taken to preserve or develop biodiversity
SDG 15	Respect for animal welfare
	Means devoted to prevention of environmental risks and pollution
	Measures taken to preserve or develop biodiversity

Even though the visibility of SDGs in the discourse diminishes over the years, it is relevant to observe this together with the frequency and network analysis, as the environmental discourse does not disappear. On the contrary, the previous analysis observes a new perspective on concepts related to suppliers, risks, performance, impact, safety, EHS, climate change, action plans, raw materials and organizational governance – themes that are linked to the SDGs. Therefore, the absence of explicit SDG references does not necessarily indicate a reduction in environmental focus. Rather, it suggests that environmental issues may be connected to organizational and managerial mechanisms rather than the explicit alignment with the SDG framework.

The absence of explicit SDG identification in 2024 is an important finding rather than a reporting omission. This is because neither the CSRD nor the ESRS requires companies to explicitly align their sustainability disclosures with the SDGs. Instead, ESRS focuses on the disclosure of material impacts, risks and opportunities,

identified through the double materiality assessment. Therefore, the absence of SDG references does not indicate non-compliance with the reporting requirements but rather suggests a change in how the company frames and communicates its sustainability efforts. At the same time, the analysis cannot establish whether this represents stronger integration of sustainability considerations into the company's business strategy and operations, or simply a change in the way sustainability is communicated in its reporting.

Taken together, the SDG analysis complements the word frequency, bigram and network analyses by revealing another dimension of change in L'Oréal's sustainability reporting. Environmental issues remain present and become increasingly connected to governance structures, but their explicit association with the SDGs disappeared in 2024.

5. Discussion and conclusions

The analysis of the 2020-2024 period reveals how environmental responsibility is constructed and communicated in the case of L'Oréal. Environmental discourse is not focused on a specific set of themes, but rather linked to organizational responsibility, risk management, financial performance, suppliers, policies, and social aspects. This evolution in the reporting discourse can be considered together with the company's financial and environmental performance. The financial and sustainability indicators reveal a pattern of economic expansion and gradual improvements in environmental performance. Based on revenue (Figure 1) and gross margin (Figure 2), the company demonstrates financial stability. This trajectory indicates an overall improvement in the company's environmental disclosure and provides an important contextual dimension to the evolution observed in the reporting discourse.

At the same time, the SDGs 12, 13, 14 and 15 become less visible during the period analyzed. In 2020 and 2021, environmental themes were directly linked to the SDGs, including themes such as circular economy, resource efficiency, pollution prevention, climate-change adaption and biodiversity. In 2022 and 2023, the SDGs were mentioned without a link to the themes, while in 2024 there was no SDG specification. The evolution suggests that reporting does not move away from environmental responsibility, but it moves from the sustainability goals framework toward a more standardized approach based on the CSRD.

The findings therefore indicate the switch from environmental objectives toward environmental responsibility as an organizational system. Over time, the discourse has focused on the mechanisms through which environmental issues are managed. The emergence and increasing prominence of terms such as *risks*, *performance*, *impact* (specific to the ESRS), *safety* and *suppliers*, together with the associations

between climate change, action plans, EHS, policies and financial performance, demonstrate this shift. Environmental responsibility becomes less about identifying an environmental objective and mentioning it, and more about demonstrating that the organization has structures in place through which environmental risks and impacts can be identified, controlled and evaluated.

The growing prominence of *suppliers* is particularly relevant to this transformation. By 2024, *suppliers* became the most prominent aspect within the environmental-related disclosures, indicating that environmental responsibility is understood through the value-chain perspective. This is consistent with the characteristics of the cosmetics industry, in which important environmental impacts occur in relation to raw materials, ingredients, packaging and logistics. L'Oréal's discourse increasingly presents the company as an actor that can influence environmental performance across its extended network. However, suppliers are independent firms, meaning that increased disclosure related to this theme cannot be interpreted as evidence that L'Oréal has eliminated all environmental risks associated with the supply chain. Instead, it demonstrates the growing importance of due diligence, supplier governance and risk management, proven by supplier monitoring, evaluation and sourcing.

The presence of executive-level oversight in 2024 further supports the interpretation that environmental issues are being positioned within higher levels of organizational governance. The disappearance of explicit SDG references in 2024 cannot be interpreted as evidence that L'Oréal has reduced its contribution to the mentioned SDGs, but it demonstrates that the SDGs have become less visible as a framework, while the environmental issues associated with them continue to appear through other forms.

Overall, the findings suggest that the main transformation for the period 2020-2024 refers to how responsibility is communicated. Reporting moves from an SDG-oriented discourse, in which environmental initiatives are connected to sustainability objectives, toward a governance-related discourse in which responsibility is embedded in organizational systems, risk management, supply-chain oversight and performance evaluation.

These findings should not be interpreted as evidence that the company's environmental practices have become more effective or more sustainable. The results capture what L'Oréal discloses on environment matters, rather than measuring environmental performance itself. The analysis focuses exclusively on one company from the industry, and even though it provides a longitudinal detailed analysis. This limits the representation of the whole industry and cannot be generalized statistically. Comparative analysis involving other cosmetics companies would be necessary to determine whether the observed shifts represent a broader

reporting trend. Another limitation is the fact that five years may not be sufficient to capture the long-term transformation in the discourse; a longer time series would help differentiate temporary reporting adjustments from structural transformation.

Future research can address the limitations by creating a comparative analysis of multiple cosmetics companies over an extended period. Another direction could be the positioning of discourse along measurable outcomes and the investigation of potential greenwashing. Such an analysis would allow a clearer distinction between substantive environmental accountability and symbolic disclosure and would clarify whether the reporting corresponds to improvements in actual environmental performance.

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