

GREEN SIGNALS OR STRATEGIC NOISE? CORPORATE REPORTING INTEGRITY ASSESSMENT THROUGH L.I.G.H.T. INDEX. A MULTI- CRITERIA COMPARATIVE ANALYSIS

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Abstract. Recent research investigates whether political connections serve to reduce or increase the tendency of corporate greenwashing. Additionally, studies on climate reporting indicate that lobbying activities misaligned with climate commitments act as counter-signal affecting the credibility of disclosures and erode stakeholders' trust in corporate governance transparency. A significant research gap in literature is the lack of utilization of publicly available data from evaluation platforms as standardized external sources for assessing greenwashing, rather than relying solely on traditional CSR/ESG reports and specific agencies rating ESG scores. In this context, the study introduces a transparency index for evaluating the greenwashing risk, named Longitudinal Integrity & Green-Hurdle Transparency (L.I.G.H.T.) Index. This index is designed to assess the coherence among climate support, transition governance, climate performance, Climate Action 100+ transparency, and the estimated proportion of green revenues. The L.I.G.H.T. Index was empirically tested through a multi-criteria comparative analysis of three leading companies within the beauty and self-care industry. The results indicate a low risk of greenwashing for Unilever, a moderate risk for L'Oréal, and a high risk for Estée Lauder. The main contribution of this empirical study lies in its innovative approach of integrating positive alignment scores with explicit penalties for internal inconsistencies among key indicators. In this framework, greenwashing is conceptualized as a misalignment between corporate signaling, governance practices, and the economic structure underpinning the green transition. Although climate capital expenditure (CapEx) was explored as a variable, it was ultimately excluded from the central scoring due to the unavailability of fully comparable public data across all three companies. Overall, the L.I.G.H.T. Index offers a robust tool for stakeholders seeking to assess the integrity and transparency of corporate climate strategies.

Key words: greenwashing; LobbyMap; TPI; Climate Action 100+; Green revenue; ESG; L.I.G.H.T. index.

JEL Classification: M41; Q56; M14

1. Introduction

As the global economy develops rapidly in the 21st century and environmental issues have become more serious, green finance has emerged as an innovative

financial idea, shifting financial resources to environmental protection to support sustainable economic development (Zan et al., 2025). In an ever-changing market, factors such as consumer demand, competition and regulations influence sustainability plans, and increasing awareness of environmental concerns has stimulated demand for green products and services (Zervoudi et al., 2025). However, some companies are prone to engaging in greenwashing practices, misleading consumers about the environmental advantages of their products and services (Galletta et al., 2024). Within this evolving landscape, lobbying remains a critical lever, not only for influencing policy outcomes but also for shaping the institutional context in which ESG practices and disclosure standards are defined and implemented (Taddeo et al., 2025). The flexible design of ESG reporting frameworks and the mainly qualitative nature of ESG disclosures have enabled many companies to carefully shape their ESG reports, aiming to portray their performance more positively (Cepêda et al., 2025). This often results in a misalignment between reporting and disclosure and actual corporate practices, a phenomenon which is known as ESG decoupling (Cepêda et al., 2025). In this context, external assessment platforms are useful because they ensure the transition from the analysis of company reports to comparable measurements. InfluenceMap/LobbyMap tracks companies' involvement in climate policies, the Transition Pathway Initiative (TPI) provides a framework for Management Quality and Carbon Performance, the Climate Action 100+ benchmark assesses Net-zero ambition, climate governance and disclosure, and Green Revenue provides an estimate of the share of turnover associated with products or solutions with a lower or regenerative impact on the environment (CDP, 2026; Climate Action 100+, 2025; InfluenceMap, 2025.; TPI Centre, 2026).

The existing literature includes numerous studies analyzing different aspects of climate reporting and the integrity of sustainability strategies in listed group companies across various industries. It also covers research on corporate sustainability aimed at identifying and measuring greenwashing, which is seen as the gap between a company's publicly presented ecological image and its actual behavior. This includes areas such as climate lobbying, green transition governance, and business models. For instance, (Xu & Zhou, 2026) explore how climate regulations unintentionally affect corporate environmental disclosures, focusing on whether tighter climate policies increase greenwashing in financially constrained firms. The analyzed sample comprises A-share-listed Chinese companies over 11 years, from 2008 to 2018. Their findings indicate that the key mechanism is that stricter climate policies lead to higher non-compliance costs and increased financial distress, especially for firms with limited financial resources in low-carbon pilot cities. This situation heightens incentives for greenwashing. Additionally, these effects are stronger among firms with lower information disclosure quality, non-state-owned firms, and companies in less competitive industries. On the same note, Fang et al. (2025) develop a greenwashing index for ESG reports and analyze the CSR reports of A-share companies listed on the Shanghai and Shenzhen stock exchange from 2008 to 2022 and analyze the influence of environmental regulation the greenwashing of these CSR reports. Their results show that environmental regulations have a significant impact of increasing the greenwashing of ESG reports and ESG disclosures facilitate certain policies. These environmental regulations compel companies to greenwash their ESG reports through increasing their financing constraints. Another study conducted by Hu et al. (2023) explored the

environmental rating disagreement (ERD) (which measures the discrepancies between ESG ratings from various raters) and its influence on future corporate greenwashing behaviour. Their findings suggest that ERD heightens the probability of future corporate greenwashing, mainly through mechanisms such as corporate information opacity and agency costs. In what concerns climate lobbying, Taddeo et al. (2025) analyse the connections between lobbying contributions and ESG disclosure of S&P 500 companies from the US, from 2014 to 2022 by implementing the GMM-SYS Arellano-Bond estimator to verify how sustainability transparency is influenced by the number of lobbying contributions. Their study suggests that firms involved more heavily in lobbying might strategically reduce transparency in their sustainability reports, possibly relying on political influence instead of public accountability.

Unlike the aforementioned studies that rely on companies' own communications, such as reports and statements and on well-known rating agencies, the present study aims to measure the discrepancy between the communicated public image and actual behaviour by using publicly available data on evaluation platforms as standardised external sources, developed by institutions established in the assessment of corporate climate transition. In this way, the study identifies the research gap in the literature that consists of not using publicly available data on evaluation platforms as standardized external sources instead of the CSR/ESG reports and specific agencies rating (such as Asset4, ThomsonReuters, Bloomberg) ESG scores to assess greenwashing and aims to bring original contributions to the development of the greenwashing measurement literature through the proposed indicators and index.

This research is twofold. First, it develops a numerical index aimed at assessing companies greenwashing risk based on the following indicators, LobbyMap, TPI Management, TPI Performance, CA100+ and Green Revenue. Further, it tests the application of the index on the following three companies: Unilever, L'Oréal and Estée Lauder. The choice is significant because, although the three companies operate in the same sector, they appear to differ in how their climate performance, political backing, and the economic structure of the green transition align. The investigation approach is driven by the following research questions:

RQ1. How can publicly available data and scores on external platforms be interpreted as signals of lower or higher greenwashing risk?

RQ2. How can companies' greenwashing risk be assessed not only by analysing public messages, but also through a combination of external indicators?

The structure of the paper includes a brief introduction to the research issue followed by an anchoring in the literature and theoretical framework exposure, a description of the data, variables and methodology used, and a presentation of the results, discussions and finally the main conclusions and implications of the study.

2. Conceptual framework and literature review

To prepare this study, recent international and national literature was reviewed, with a focus on publications from the last five years. The review synthesised works that use signalling theory to evaluate the credibility of green signals conveyed by corporations (such as ESG reports, Net-zero commitments, and sustainability communications) and their links to governance mechanisms, political connections or influence, and greenwashing. From a Signaling Theory perspective, ESG

communication shapes stakeholder perceptions by signalling a firm's commitment to sustainability (Cinceoglu et al., 2026). This theory has played a key role in examining how companies employ green marketing to stand out and how consumers perceive these signals, especially regarding potential greenwashing (Forliano et al., 2025). For example, Connelly et al. (2011) argue that each company has the chance to either reveal or hide its true quality to outsiders. This suggests that, when considering the costs, lower-performing organizations also see a strong incentive, due to expected legitimacy gains, to send false signals. As a result, stakeholders are unable to differentiate between genuine and superficial value-based communication on company's green initiatives. On the same note, Spence (2002) argues that a reason for the success of corporations in providing misleading signals lies within the communication, which is based on information asymmetry between the signaler (the company) and the receiver (the stakeholders). Therefore, due to the information asymmetry between an organization and its relevant stakeholders, false green communication can be used as a signal of corporate environmental behaviour (Seele & Gatti, 2017). In the area of sustainability, green signals can include ESG/sustainability reports, certifications/labels, Net-zero promises, and advertising claims (Hilton, 2025; Montgomery et al., 2023). Recent studies indicate that companies may strategically choose among honest reporting, greenwashing (excessive disclosure), and greenhushing (withholding communication) based on cost-benefit analysis and the potential penalties for providing false signals (Hilton, 2025). Recent research indicates that lobbying activity and its alignment with climate commitments serve as signals or counter-signals. The gap between promises and actions, even in politics, increases the risk of greenwashing beyond what reports reveal (Brown et al., 2026). Simultaneously, recent reviews highlight the diversification of greenwashing practices the shift towards narratives about the future (such as net zero commitments), which increases the importance of verification mechanisms and the institutional framework (Montgomery et al., 2023).

The emergence of greenwashing as strategic signaling outcome. Theoretical research indicates that greenwashing can happen as an equilibrium when the reputational or financial gains from green signals exceed the costs and penalties of false signaling. In a signaling game context, greenwash occurs if the penalties for making false claims are too low, and greenwash can also happen if the signaling costs are disproportionately high compared to the benefits (Hilton, 2025). Recent reviews confirm that greenwashing has evolved from simple static communications to consumers to more dynamic forms and future-oriented narratives, making it harder to judge the credibility of these signals and requiring multiple sources usage for verification (Montgomery et al., 2023).

Assessing corporate governance role in supporting the signals credibility. A key empirical focus is on whether governance mechanisms make false signaling more costly and help reduce greenwashing. In an emerging market context of mandatory reporting, Lee et al. (2025) show that board independence and gender diversity are associated with reduced greenwashing, and political connections and sensitive industries may moderate the governance-greenwashing relationship. However, the evidence is not entirely conclusive, and Ghitti et al. (2024) propose new measures to detect greenwashing and some board characteristics, such as board independence, may be linked to increased greenwashing, indicating possible symbolic use of governance mechanisms. Additionally, they show that greenwashing can negatively impact firm value (Ghitti et al., 2024).

ESG assurance as a signal verification mechanism. Recent research treats ESG assurance as a mechanism that increases signal verifiability and reduces information asymmetry. Bu et al. (2024) empirically shows in a study conducted on Chinese companies from 2014 to 2022 that ESG assurance/auditing significantly reduces greenwashing. Thus, the effect is stronger in contexts with a weaker legal environment and when managerial ownership is low, and ESG performance can mediate the relationship between assurance and greenwashing (Bu et al., 2024).

Political influence (political connections) and counter-signals (lobbying). Recent literature investigates whether political connections discipline or, on the contrary, facilitate greenwashing. Chen et al. (2025) shows that politically connected non-SOE firms in China have lower greenwashing intensity, using anti-corruption campaigns as an exogenous shock, reporting an increase in greenwashing after weakening political ties, and the mechanisms identified include easing financial constraints, increased public scrutiny, and regulatory pressures. In parallel, studies on climate commitments highlight that lobbying that is not aligned with climate promises acts as a counter-signal that undermines the credibility of promises. (Brown et al., 2026) develop a framework to evaluate the greenwashing risk for over 4,000 companies, explicitly incorporating lobbying activity as a risk factor. As the authors highlight, climate commitments often involve significant greenwashing risks (Brown et al., 2026). Lee et al. (2025) also show that the network of political connections can influence how governance affects greenwashing in corporate reporting. This indicates that political influence may strengthen or weaken the impact of internal control mechanisms (Lee et al., 2025).

Operationalizing greenwashing as a gap between communication and performance. An important methodological aspect is to measure greenwashing through the misalignment between the language/tone of reporting and ESG performance or other objective data. Thus, Motz et al. (2026) propose an automated greenwashing tendency score (GTS), based on NLP (sentiment analysis on companies' sustainability reports and alignment analysis between these reports and the UN's Sustainable Development Goals (SDGs)) and ESG ratings, applied to 36 German stock index companies from 2020 to 2022, providing a reproducible tool for monitoring and analysis. Zhou & Chen (2024) build an EDG (Environmental Disclosure Greenwashing) index. Based on textual analysis of annual reports, it is shown that public attention decreases EDG primarily through a surveillance effect rather than a legitimisation incentive. Additionally, formal regulations can have negative effects, which can be mitigated through informal monitoring mechanisms. In the table below, we present in summary the measurement objectives examined, the authors of the studies and the main research gaps identified in the selected specific literature.

Methodologically, the study is part of the literature that treats greenwashing as a problem of misalignment among several ways of interpreting corporate performance: narrative, political, operational, and financial. In the Climate Action 100+ benchmark, a company's assessment considers not only decarbonization targets, but also the delivery strategy, the role of climate solutions, capital allocation and the coherence of climate policy engagement positions (Climate Action 100+, 2025.; CA100 2024 Benchmark Results Summary, 2024).

Table 1. Operationalizing relevant studies and identifying research gaps

No.	Construct	Measuring objective	Authors of the study	Research gaps
1.	Greenwashing	Communication–performance gap; risk indicators in net-zero pledges; NLP scores versus ESG ratings; Greenwashing Tendency Score (GTS); Environmental Disclosure–Greenness (EDG) index.	Brown et al., 2026; Motz et al., 2026; Zhou & Chen, 2024; Ghitti et al., 2024	Incomplete integration of multi-channel signals: most analyses treat ESG reporting and political lobbying as separate issues, even though research on net-zero pledges clearly shows that political counter-signals are just as relevant to greenwashing risk.
2.	Governance	Board independence, gender diversity, CEO non-duality, board size, and internal control quality.	Lee et al., 2025; Ghitti et al., 2024	While recent studies offer causal insights into political connections, few address governance as an endogenous signalling cost within a formal signalling framework, or examine how governance interacts with ESG assurance to reduce greenwashing.
3.	Assurance	ESG assurance intensity; robust causal identification (PSM, instrumental variables); mediation through ESG performance quality.	Bu et al., 2024	Ambiguity in governance effects and divergent empirical findings (e.g., board independence can either reduce or increase greenwashing depending on the study), pointing to the need for boundary conditions such as institutional context, industry sensitivity, and the type of environmental signal used.
4	Political influence	Political connection dummy variables; exogenous shocks (e.g., anti-corruption campaigns) used for causal identification	Chen et al., 2025; Lee et al., 2025	Lack of long time-series data and dynamic signalling analysis. Literature reviews highlight a growing shift toward future-oriented climate pledges and more sophisticated greenwashing tactics. Longitudinal research designs are needed to capture how firms adjust their disclosure signals over time, whether they shift toward greenhushing, and how they respond to enforcement pressures.
5.	Counter signals	Lobbying alignment scores (InfluenceMap), environmental controversies and sanctions, Scope 3 inconsistencies, and similar objective indicators.	Brown et al., 2026	Over-reliance on ESG ratings and the need for data triangulation. NLP-based detection tools built on ESG ratings risk inheriting the noise and biases embedded in those ratings. Future research should combine them with objective, externally verified data — such as environmental violations, regulatory sanctions, Scope 3 coverage gaps, and lobbying records.

No.	Construct	Measuring objective	Authors of the study	Research gaps
6.	Outcomes	Market value (Tobin's Q); stakeholder reaction assessments; corporate legitimacy.	Ghitti et al., 2024; Zhou & Chen, 2024	Under-explored link between greenwashing outcomes and assurance/audit design. While the literature consistently calls for stronger verification mechanisms, very few models explicitly connect the type and quality of assurance or auditing to the signaling equilibria that determine whether firms choose truthful disclosure, greenwashing, or greenhushing.

Source: authors' work based on the synthesis of relevant studies on the topic

TPI explicitly emphasizes that Management Quality and Carbon Performance are complementary and should be read together, not separately (TPI Centre, 2026). In the context of the application of the provisions of the EU Green Claims Directive in 2026, the greenwashing phenomenon has evolved from simple advertising omissions to complex forms of “hidden lobbying” and misalignment of capital expenditure (CapEx) with declared Net-zero objectives.

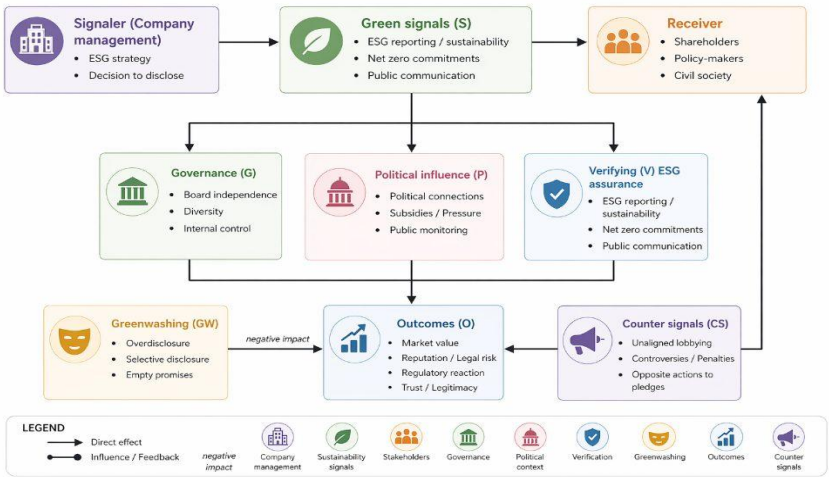


Figure 1. Theoretical framework
Source: authors' projection

The present research uses signaling theory to assess whether green signals transmissions by companies are supported by rigorous mechanisms of governance and political influence. Figure 1 illustrates the model of the conceptual theoretical framework of the present research. On this basis, the paper treats greenwashing not as a binary variable but as a permanent risk. A company can be convincing if its scores on several dimensions converge, it can be ambiguous when its technical performance is relatively good but political support lags behind, and it can be vulnerable when management, performance, and transparency are all weak. This conceptualization justifies the

introduction of a penalty for inconsistency between indicators in the constructed index formula.

3. Data and methodology

The underlying data used for the 2026 comparative panel in calculating the greenwashing risk index was provided by external public data platforms and took the form of a harmonized working set. The selection of the three companies (L'Oréal, Unilever, Estée Lauder) is justified by the fact that they belong to the same economic sector of consumer goods, the beauty & self-care industry, but differ significantly in their exposure to external assessments regarding the climate transition. Thus, public external data were used to delimit the following indicators used in the research to build the index, LobbyMap Score, TPI Management Quality, TPI Carbon Performance, CA100+ indicators fulfilled and Green Revenue estimates (Table 2). This panel was treated as an exogenous modeling dataset. Simultaneously, the public methodology and, where possible, the public profiles of the companies were checked.

Table 2. Indicators included in the baseline scenario

Indicator	Description
InfluenceMap	Measures the alignment between public statements and political lobbying activities.
TPI Management	Assess the integration of climate governance into decision-making.
TPI Performance	Verify if emissions are on the 1.5°C trajectory according to the Paris Agreement.
CA100+	Benchmark conducted by investors to verify ten climate action criteria.
Green Revenue	Percentage of revenue generated by sustainable activities according to the taxonomy.

Source: own projection based on publicly available external data on platforms

TPI publicly displays L'Oréal level 4 and Unilever level 5 on Management Quality, and the TPI methodology specifies that Management Quality and Carbon Performance represent complementary technical foundations of the assessment (TPI Centre, 2026; L'Oréal - TPI, 2025; Unilever - TPI, 2025). In LobbyMap, L'Oréal's public profile describes a company "broadly supportive" of climate policy, but with exceptions and mixed positions on the energy transition, Unilever's public profile indicates stronger support for ambitious climate action and Estée Lauder's profile shows a very low intensity of direct engagement, so the score is derived mainly from relations with industry associations (InfluenceMap, 2025). A difference can be observed between the 2026 harmonized panel and some publicly visible values in the current LobbyMap profiles of the companies analyzed. That is why the study includes the robustness test in which the ranking of the companies is retested under an alternative scenario that substitutes the LobbyMap ranges in the panel with the publicly visible values at the time of the analysis. Climate CapEx was investigated separately. CA100+ shows that climate solutions disclosure and climate capital disclosure are closely related, but no perfect symmetrical values were identified for all three companies, consequently, CapEx was not included in the central score but discussed separately (CA100 2024 Benchmark Results Summary, 2024).

The method used is comparative case study, suitable when the research object is complex, contextual and multidimensional. From an inferential point of view, the study does not aim to demonstrate strict causality, but to identify patterns of convergence or divergence between external scores and interpret them as signals of a lower or higher risk of greenwashing.

Variables, standardization and construction of the L.I.G.H.T. index. In this study, the risk of greenwashing is assessed through three types of gaps:

- political support gap: the company communicates climate ambition, but InfluenceMap scores indicate weak or ambiguous alignment of its involvement in climate policies.
- corporate governance gap: the company formulates climate objectives, but TPI Management indicates limited integration of the transition into decision-making processes.
- the economic transparency of solutions gap: the company claims to participate in the green transition, but there is no sufficient external evidence of revenues from "climate solutions" or externally assessed carbon performance.

The proposed indicator based on data identified in external platforms is called "*The Longitudinal Integrity & Green-Hurdle Transparency Index*", acronym LI.G.H.T. index and measures the risk of greenwashing. The basic idea behind the index construction is simple: first build a positive alignment score, then add a penalty for internal inconsistency. Thus, greenwashing is modeled as the opposite of climate ESG coherence.

For the LobbyMap component, the ranges were transformed to an ordinal scale of 0-100. In the 2026 panel, Unilever = A-, L'Oréal = B, Estée Lauder = C+ were converted to scores of 90, 70 and 50. For the TPI Management Quality, the scale was standardized to 100 for 4*, 90 for 4 and 70 for 3. For the TPI Performance, the category "1.5°C aligned" was coded 100 and "Below 2°C" was coded 70. For CA100+, the fulfilled indicators were scaled proportionally, 8/10 = 80, 7/10 = 70, 4/10 = 40. Green Revenue was normalized relative to the maximum in the sample, not to a universal threshold, as there is not yet a unified and homogeneous methodological consensus for a perfectly comparable 2026 sectoral threshold between platforms. Thus, the identified estimates were transformed as follows: 32% was mapped to 100, 28% to 87.5 and 12% to 37.5.

The Longitudinal Integrity & Green-Hurdle Transparency Index formula is:

$$L.I.G.H.T. \text{ index}_i = 100 - \sum (w_t * S_{it}) + \lambda * \sigma_i,$$

Where: S_{it} represents the standardized score of company i for indicator t , and σ_i is the standard deviation of the company's standardized score vector, w represents the weight of indicator t . The theoretical weights used in the baseline scenario were: LobbyMap 0.30; TPI Management 0.20; TPI Performance 0.20; CA100+ 0.15; Green Revenue 0.15. The penalty parameter was set at $\lambda = 0.25$. A higher value of the index means a higher risk of greenwashing.

4. Results

Table 3 summarizes the raw values of the indicators used in the baseline scenario. In descriptive terms, Unilever dominates the panel in both climate lobbying and

management, performance and transparency. L'Oréal has a strong but slightly lower profile and Estée Lauder consistently ranks below the other two companies, especially in Green Revenue and the CA100+ indicators.

Table 3. 2026 comparative panel used in the baseline scenario

Company	LobbyMap Score	TPI Management	TPI Performance	CA100+	Green Revenue est.
L'Oréal	B	4	Aliniat 1.5°C	7/10	28%
Unilever	A-	4*	Aliniat 1.5°C	8/10	32%
Estée Lauder	C+	3	Below 2°C	4/10	12%

Source: data gathered from the external platforms

Green Revenue represents working estimates based on the degree of green economic transition. Thus, for L'Oréal and Unilever there are additional public sources on ESG positioning, but no single and perfectly comparable taxonomic threshold for the three companies at the time of the analysis. Therefore, a percentage of 32% was set for Unilever's already partially green economic model, 28% for L'Oréal's advanced but incomplete transition and 12% for Estée Lauder's attachment to the traditional business model. The premise from which the estimate was made was that without green revenues there is a high risk of greenwashing. Applying the formula for determining the L.I.G.H.T. index leads to the following values: Unilever = 8.0, L'Oréal = 20.3 and Estée Lauder = 48.9 (Table 4). Their interpretation is consistent with theoretical expectations. Unilever has the lowest risk of greenwashing, which reflects the convergence between supported public policies, climate management and the relatively high share of green revenues. L'Oréal is positioned in an intermediate zone, technical and managerial performance is high, but lobbying and disclosure are less convergent than in the case of Unilever. Estée Lauder has the highest risk, as all relevant components are weaker and Green Revenue is much lower. What is important to mention is that the L.I.G.H.T. index should not be interpreted as a legal verdict or as evidence of fraudulent intent. It is a comparative risk index. It shows how likely it is that the public image of a "green" company is stronger than the observable concrete substance offered by the selected indicators. In this sense, the index is closer to the logic of reputational risk and stewardship than to the logic of a regulatory sanction.

Table 4. Standardization and results of the L.I.G.H.T. index

Company	Alignment score	Inconsistency penalty	L.I.G.H.T. index
L'Oréal	82.6	2.9	20.3
Unilever	94.0	2.0	8.0
Estée Lauder	54.6	3.5	48.9

Source: own calculations

To interpret the index, heuristic thresholds were imposed that serve the multi-criteria comparative analysis only for the present case study, as follows: 0-15 = low risk; 15-35 = moderate risk; over 35 = high risk; over 50 = very high risk. Figure 2 illustrates the comparative profile of the indicators analyzed and included in the construction of the index.

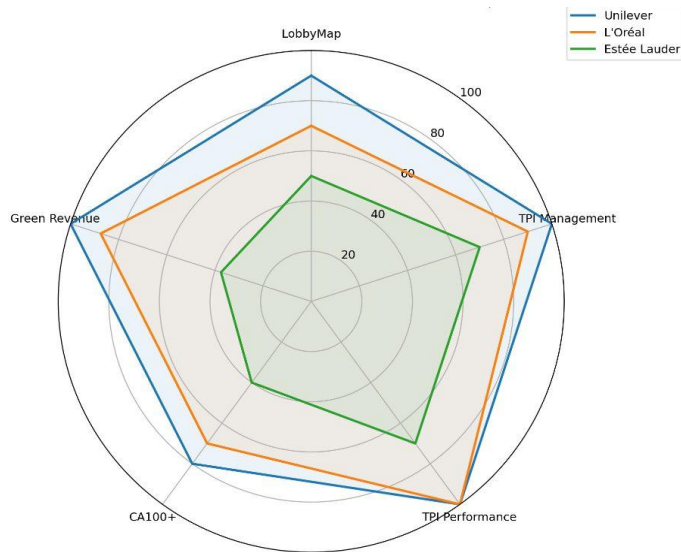


Figure 2. Comparative profile of standardized indicators

Source: own calculations based on the 2026 harmonized panel

As can be seen from Figure 3, Unilever has the lowest risk of greenwashing, L'Oréal a moderate risk and the Estée Lauder index indicate a high risk.

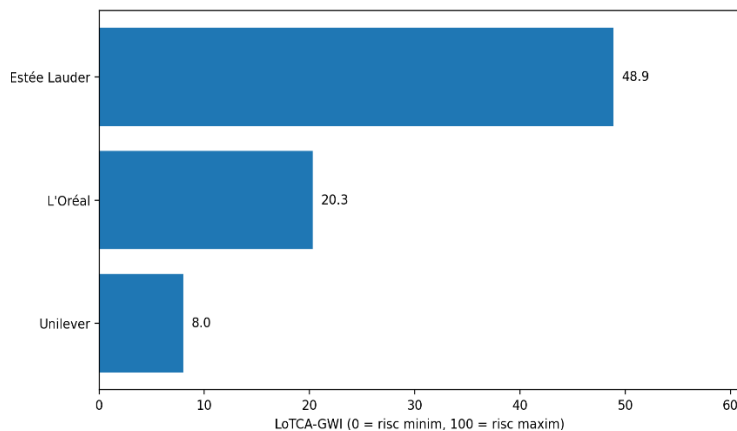


Figure 3. The L.I.G.H.T. index

Source: own calculations

Robustness of the results. Robustness was tested in four alternative ways. The first scenario is the baseline and imposes theoretical weights plus the inconsistency penalty. The second uses equal weights. The third removes the penalty, to see if the ordering is produced only by the average alignment and the fourth replaces the LobbyMap band in the panel with the publicly visible values at the time of the analysis, respectively B-for Unilever, C+ for L'Oréal and D+ for Estée Lauder, keeping the other components unchanged (InfluenceMap, 2025). In all four scenarios, the hierarchy remains the same: Unilever has the lowest risk, L'Oréal remains in the middle, and Estée Lauder has the highest risk of greenwashing

(Figure 4). This stability is important. It shows that the result does not depend on a single arbitrary choice of weight nor on a single version of the LobbyMap scores. Furthermore, the difference between Unilever and Estée Lauder is large enough not to be cancelled out by reasonable rescaling scenarios.

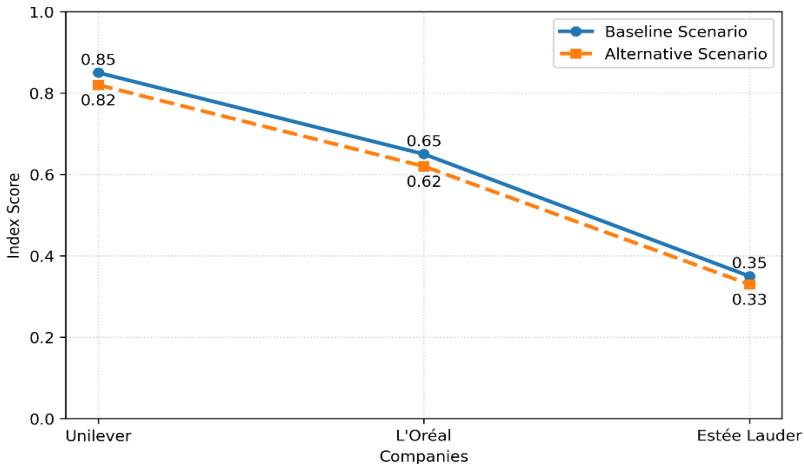


Figure 4. Robustness test

Source: own calculations

5. Discussion

Beyond the L.I.G.H.T. greenwashing index score, the data also allows for an integrated reading of climate ESG performance. L'Oréal reports a CDP triple A score for climate, water and forests for 2025 and an EcoVadis Platinum rating of 84/100, confirming a very solid ESG infrastructure (L'Oréal, 2025a; L'Oréal, 2025b). Estée Lauder, in turn, shows recognition on the CDP A List for its 2024 climate change disclosure, which suggests that its problem is not the complete absence of ESG effort, but rather insufficient coherence between disclosure, lobbying and economic structure (Estée Lauder Companies, 2025a). Unilever has a very robust climate policy engagement review and climate transition action plan framework, and the CA100+ benchmark gives it a relatively advanced position among companies in the sector (Climate Action 100+, n.d.; Unilever, 2025a; Unilever, 2025b). Thus, the L.I.G.H.T. greenwashing index should not be confused with a general ESG rating.

A company can have good ESG or disclosure scores and still be penalized by a greenwashing model if its political support or green revenue structure does not confirm the same ambition. In this sense, L'Oréal is a case of "moderate risk through misalignment", not poor ESG performance. At the opposite end, Unilever achieves both a relatively strong climate performance and a more coherent lobbying profile. Thus, the results obtained for the L.I.G.H.T. index reveal a lack of convergence between the dimensions analyzed within the integrated approach to the risk of greenwashing, the analysis relying almost exclusively on public data existing on external platforms.

The results show that, in this comparison, the best predictor of greenwashing risk is not the simple existence of declared climate objectives, but the convergence of several dimensions, such as the quality of climate management, lobbying alignment, and the density of external evaluation. Unilever outperforms precisely because these

three dimensions support each other. L'Oréal has a reasonable but less consolidated profile. Estée Lauder is disadvantaged by the combination of a weak InfluenceMap score and a lower TPI Management level. A second important observation is that the lack of data is itself a research information. The fact that TPI Carbon Performance is not publicly assessed for any of the companies prevents testing a key hypothesis, whether better managed companies also have better carbon performance. Also, the fact that only Unilever is a fully covered company on CA100+ limits the comparability of the CA100+ and Green Revenue indicators. Furthermore, the analysis suggests that political support is one of the most sensitive areas for detecting greenwashing. A company can have well-articulated targets, reports and narratives, but if political engagement is weak, contradictory or non-transparent, climate credibility decreases. In this regard, the InfluenceMap platform is particularly valuable, as it moves the analysis from claims to conduct.

Furthermore, the search for comparable data on climate CapEx confirmed the relevance of the indicator, but also the difficulty of using it in a case study based on comparative analysis with heterogeneous public sources. The CA100+ benchmark summary for 2024 shows that 38% of the companies assessed disclose the amount of capital expenditures allocated to climate solutions and that 37% disclose the future capital allocation for such solutions, while 78% of the companies that aim to increase their revenues from climate solutions also disclose at least some data on their future CapEx (CA100 2024 Benchmark Results Summary, 2024). However, for the three companies analyzed in this study, not perfectly comparable, public and methodologically homogeneous values were identified for the same reporting year. Consequently, including CapEx in the L.I.G.H.T. index formula would have introduced more uncertainty than explanatory value. The decision to exclude is deliberate and conservative. A narrower, but auditable index was preferred over a richer, but fragile index.

For academic research, the L.I.G.H.T. index provides a transparent way to operationalize greenwashing as a numerical variable. For investors, it can function as an auxiliary stewardship tool, especially where aggregate ESG scores mask gaps between political support, governance, and business models. For regulators, the results reinforce the idea that climate disclosure should be more explicitly linked to disclosure on climate lobbying, climate solutions and capital allocation. In the absence of interoperable standards between these components, companies may project a more coherent climate image than their economic architecture actually is.

6. Conclusions

In the context of the evolution of climate taxonomies (EU Taxonomy 2026, CA100+), the assessment of ESG credibility requires the simultaneous integration of:

- real climate performance (TPI Performance)
- climate governance (TPI Management)
- political influence (InfluenceMap)
- implementation of climate transparency (CA100+)
- economic structure of the business model (Green Revenue, Green CapEx)

This research proposes an integrated model that allows the identification and assessment of greenwashing as a phenomenon of systemic misalignment between these dimensions.

The central goal of the study is to create and test a greenwashing risk index, the L.I.G.H.T. index, for three companies in the beauty and self-care industry. The

Longitudinal Integrity & Green-Hurdle Transparency Index (L.I.G.H.T.) index is an original indicator that semantically suggests the action of shedding light on the "gray" or dark areas of corporate reporting. A high L.I.G.H.T. score means a non-transparent company, operating in the "shadow" (greenwashing), while a low score indicates a company is transparent and acts as it declares. For the companies selected to be included in the case study, the main result is stable, with Unilever presenting the lowest risk, L'Oréal a moderate risk, and Estée Lauder a high risk. The major theoretical contribution is the introduction of explicit penalization of inconsistency between indicators.

In this model, greenwashing is not just underperformance, it is mainly a misalignment between what the company declares, how it governs its transition, what it supports in the political space, and how much of its economic activity can be associated with products or solutions with a better climate profile. At the same time, the study maintains strict methodological discipline, insufficiently comparable indicators, such as climate CapEx, are discussed but not forced into the index. This conservative choice makes the results more robust and credible.

The robustness of the analysis is demonstrated by multi-source triangulation, convergence between independent indicators, and consistency between performance and the economic structure of the business model. As with any research, the study has limitations that can be found in the estimates made for Green Revenue, the interpretation of CapEx based on proxies, and the lack of global standardization. Future work can extend the model by integrating time series, official taxonomic thresholds for Green Revenue, and comparable values of CapEx aligned with the climate transition.

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