Materiality assessment and interconnectedness of Sustainable Development Goals: Uncovering misalignments between corporate and stakeholder priorities

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Abstract

Purpose: Companies are encouraged to proactively identify and address the sustainability issues most relevant to stakeholders and respond to their concerns and expectations. The paper examines how materiality assessment and the interconnectedness of Sustainable Development Goals (SDGs) can help uncover misalignments between corporate sustainability priorities and stakeholder expectations.

Design/methodology/approach: We focus on Nestlé as a case study, analyzing its sustainability reports alongside stakeholder discussions on Twitter. Nestlé's SDG-related disclosures were used to construct a materiality matrix, while stakeholder communications were manually coded. We then compared the constructed matrix with Nestlé's own materiality matrix provided in its sustainability report. Additionally, we conducted social network analysis to explore the interconnectedness of SDGs as portrayed in Nestlé's sustainability report and reflected in stakeholder discussions on Twitter.

Findings: The study reveals misalignments between Nestlé's sustainability report and stakeholders' sustainability concerns expressed on social media. For example, while both Nestlé and stakeholders recognize the importance of SDG 12 *Responsible Consumption and Production*, stakeholders place greater emphasis on SDG 6 *Clean Water and Sanitation* than the company's matrix suggests. Social network analysis of SDG interconnectedness further highlights distinct perspectives between Nestlé and its stakeholders, with SDG 12 emerging as a central theme.

Originality: This study contributes new insights into the use of materiality assessment and SDG interconnectedness to reduce misalignments between corporate and stakeholder SDG priorities. It demonstrates the value of alternative data sources, particularly social media, in supporting materiality assessments and SDG interconnectedness analysis. Moreover, it illustrates how stakeholder discussions on social media and social network analysis can be used to examine the interconnections among SDGs as perceived by both companies and stakeholders.

Practical implications: When developing their methodologies for materiality assessment, companies should consider using various sources of information, including social media. Furthermore, interconnectedness analysis can help uncover misalignments between corporate and stakeholder priorities. Finally, materiality assessment may be more effective and credible when conducted independently from a third party.

Social implications: Achieving the SDGs requires coordination, collaboration, and effective reporting.

Keywords: stakeholders; SDGs; interconnectedness; materiality assessment; Nestlé; social media

Materiality Assessment and Interconnectedness of Sustainable Development Goals: Uncovering Misalignments Between Corporate and Stakeholder Priorities

1. Introduction

Sustainable development is one of the most critical global challenges of the 21st century which requires a balanced approach that integrates environmental, social, and economic considerations. In response, the United Nations introduced the 17 Sustainable Development Goals (SDGs). Agenda 2030, adopted by all 193 UN Member States, was primarily directed at governments. However, it also recognized the essential role of the private sector – including micro-enterprises, cooperatives and multinational corporations – in achieving these objectives. Furthermore, businesses were encouraged not only to contribute actively to the SDGs but also to report on their progress, aligning with SDG 12 *Responsible Consumption and Production*, Target 12.6, which is to *Encourage Companies to Adopt Sustainable Practices and Sustainability Reporting*. Ban Ki-moon, former UN Secretary-General, underscored the significance of corporate engagement, emphasizing that businesses are key partners in achieving the SDGs. He urged companies to contribute to their achievement through their core activities, evaluate their impact, set ambitious sustainability targets, and communicate the results transparently (CDSB, 2025).

Sustainability-related communication by companies typically involves conducting a materiality assessment first—to identify and prioritize the sustainability issues most relevant to their business and stakeholders. Through this process, organizations not only align their strategic priorities with sustainability goals but also enhance their legitimacy by demonstrating a structured approach to corporate responsibility (Beyne and Moratis, 2025). The disclosure of materiality matrices serves as a powerful tool, providing stakeholders with valuable insights into how a company determines its sustainability strategy. By visually mapping the significance of various sustainability topics, these matrices enhance transparency and accountability. Additionally, company-stakeholder communication plays a critical role in informing the materiality assessment process (Beyne and Moratis, 2025). Social media platforms are increasingly used for this purpose as they provide businesses with opportunities to engage stakeholders in interactive communication, where stakeholders can respond, comment, and initiate discussions. Despite the extensive literature on the use of social media in corporate-stakeholder communication (Bellucci and Manetti, 2017; Gómez-Carrasco and Michelon, 2017; Manetti and Bellucci, 2016; Manetti *et al*., 2017), and while studies focusing specifically on SDGs and social media from the company perspective (De Luca *et al*., 2022; Mehmood *et al*., 2023; Nicolò and Cervilla-Bellido, 2025) are prevalent, the stakeholder perspective on social media communication in relation to SDGs remains largely unexplored.

When determining which SDG issues are relevant, companies need to be aware that SDGs are interconnected, which ones and how, meaning that progress in one area can impact others—positively or negatively (Nilsson *et al*., 2016; Weitz *et al*., 2018). Successful efforts toward SDG achievement require recognizing synergies, mitigating trade-offs, and systematically measuring interactions to ensure meaningful progress (Pradhan *et al.,* 2017). Therefore, the interconnectedness across different SDGs has been a focus and discussion at the macro policy level (Nilsson *et al*., 2018). For instance, Weitz *et al*. (2014) discuss a nexus of water-energy-food and suggest that a better understanding of interactions must extend beyond simple synergies and trade-offs. Interconnectedness across SDGs can be both positive and negative. Research has analyzed these interconnections by exploring links between specific SDGs or subsets of goals (Boas *et al*., 2016; Le Blanc, 2015). At the corporate level, Fiandrino *et al*. (2022) argue that companies can strengthen their social impact through the SDGs by giving greater consideration to the interconnectedness of the goals and the inclusiveness of stakeholders. However, comprehensive studies examining interactions across all SDGs at the company level remain limited, particularly from the perspective of stakeholders (Guidi *et al*., 2025).

As companies assess which SDG issues are material, it becomes increasingly important to consider whether their sustainability disclosures adequately reflect this interconnectedness in a way that aligns with stakeholder concerns. Prior research indicates a potential misalignment between the information companies disclose and the issues stakeholders expect or deem relevant (Beske *et al*., 2020; Power, 2009; Pizzi, 2023; Puroila and Mäkelä, 2019).

Given the above, we formulate the following research question: *How do corporate SDG disclosures (mis)align with stakeholders' concerns as expressed on Twitter, with regards to materiality assessment and SDG interconnectedness?*

The research focuses on a case study of Nestlé. The company is a leading multinational enterprise that highlights its commitment to contributing to SDGs (Nestlé, 2023) and has provided support for the United Nations (UN) Global Compact as a founding member thereof (Nestlé, 2016). Our analysis focuses on the year 2016, as it is the first fiscal year after the introduction of the SDGs in 2015 and because the company faced several serious scandals during this period, which led to intense discussions among its stakeholders. The empirical material was collected through content analysis of Nestlé's sustainability report and stakeholder tweets. To address our research question, we identified the materiality matrix presented by the company in its 2016 sustainability report. Subsequently, we attempted to create an alternative matrix based on our observations of Nestlé's SDG-related disclosures within the report and stakeholder discussions on Twitter. To understand the company's perspective on SDG materiality, we conducted a content analysis of its report. To identify stakeholders' priorities, we analyzed and coded 19,644 tweets containing stakeholder communication regarding the SDGs. Based on this information, the materiality matrix was constructed. We also conducted social network analysis to examine and compare the interconnectedness of the SDGs portrayed by Nestlé in its 2016 sustainability report and presented by the stakeholders on Twitter.

We selected Twitter as an empirical setting for our materiality analysis related to the SDGs. Before the change of ownership and the name of the platform, Twitter was perceived as a "public arena of citizenship" (Saxton *et al*., 2021, p. 2) and was known for information dissemination by various stakeholders who frequently shared their opinions related to the SDGs (cf. Grover *et al*., 2021). Twitter was also preferable than other social media platforms in our research setting due to its ability to retrieve users' profile information, which can be used to categorize stakeholder groups and reveal more insights into the SDGs communicated by various stakeholder groups. Moreover, Nestlé has achieved the highest ranking on the SB Influencers 100 Index (e.g., Salterbaxter, 2023), which ranks the top 100 companies shaping the sustainability agenda through social media, especially Twitter.

Our findings indicate that the materiality matrix presented by the company differs from the one constructed using disclosures from the 2016 sustainability report and stakeholders' tweets. While both the company and stakeholders identify SDG 12 (*Responsible Consumption and Production*) as highly important, stakeholders place greater importance on SDG 6 (*Clean Water and Sanitation*) than is reflected in Nestlé's matrix. Conversely, while Nestlé prioritizes nutrition-related issues, stakeholders discuss these topics but view them as relatively less critical. Analysis of SDGs interconnectedness further suggests that Nestlé's disclosures and stakeholder communications reveal distinct yet overlapping clusters of interconnected sustainability goals, with SDG 12 emerging as a central theme. However, despite Nestlé's emphasis on all 17 SDGs, both its report and stakeholder discussions show varying views on their interconnectedness.

This paper makes two important contributions. First, a growing body of research examines the role and potential of materiality assessments in sustainability reporting (Cerbone and Maroun, 2020; Puroila and Mäkelä, 2019). While materiality assessments can help companies identify SDGs priorities, they may also lead companies to prioritize certain stakeholder interests over others (Cerbone and Maroun, 2020) or to present a unified corporate vision that fails to reflect stakeholder diversity (Cho *et al*., 2015). Our paper extends this discussion by emphasizing the role of materiality assessment as a mechanism for aligning corporate and stakeholders' SDGs priorities. We also point out the importance of incorporating interconnectedness analysis related to the SDGs. Although this has been investigated at country level, the research at the company level remains largely absent. Our paper adds to this discussion by emphasizing the need to consider the connections between SDGs in companies' reporting and in stakeholder communications.

Second, our study underscores the value of incorporating alternative data sources – particularly social media – to enhance corporate sustainability assessments. By using social media as a communication tool, companies can capture a wider range of stakeholder opinions and engage in dynamic, ongoing discussions that contribute to more accurate materiality assessments, as well as SDGs interconnectedness analyses. This study demonstrates the construction of materiality assessment using stakeholder-communicated information on social media. It also illustrates how social network analysis can be used to examine perceived interconnections among sustainability goals by both corporations and different stakeholder groups (Boas *et al*. 2016; Le Blanc, 2015; Nilsson *et al*., 2016), helping to identify the most significant SDG combinations for greater synergies.

The remainder of this paper is thus structured as follows. The next section offers a literature review on the materiality assessment as the basis for SDG reporting, the interconnectedness of the SDGs, and the role of social media in communication on SDGs. The case background and research framework are described in Section three. Section four presents the research results. The last section discusses the results, presents the study's contribution, addresses its limitations, and articulates future research possibilities.

2. Literature review

2.1 SDG reporting and materiality assessment

Materiality assessment is a concept widely recognized as the process of "determining what events and issues are considered important enough to be included within reporting, and relatedly, what events and issues are not considered important enough to be included" (Bolt and Tregidga, 2023, p. 405). Sustainability reporting encompasses a diverse range of topics, leading to varying information requirements for the diverse stakeholders it serves. As a result, companies often face challenges in discerning what information is of material significance and should, therefore, be disclosed (Reimsbach *et al*., 2020). The purpose of the materiality assessment is thus to enhance transparency and accountability by ensuring that these reports primarily concentrate on relevant information, diminishing the inclusion of unnecessary sustainability details. Studies indicate that materiality assessment is more of a socioeconomic and political construct rather than a purely technical one (Lai *et al*., 2017). Moreover, materiality assessment concerns the larger context of corporate communication, especially via its role in shaping wider societal perspectives on sustainable development (Puroila and Mäkelä, 2019).

Not only is the materiality assessment process itself essential, but reporting on that process is also crucial. Stakeholders need to understand how companies apply materiality principles (Abhayawansa, 2022) and companies can enhance the transparency to relevant stakeholders through reporting on their materiality analysis (Beske *et al*., 2020). Often, materiality assessments are presented and visualized using a materiality *matrix*. Such a matrix illustrates the prioritization of sustainability issues in a two-dimensional diagram, in which the two axes represent the interests of different stakeholder groups and the company. The Y-axis typically represents "Importance for stakeholders," while the X-axis reflects "Importance for the company" or a similar variation (Jørgensen *et al*., 2021). Thus, the materiality matrix provides a mapping of stakeholder priorities against the company's declared intention, or *vice versa*.

With the introduction of the Agenda 2030's principles of people, planet, prosperity, peace, and partnership aiming to envision a common future for all (McMichael, 2017), the global community is at a critical point in its quest to meet the 17 SDGs and 169 accompanying targets adopted by the United Nations Member States in 2015 (UN, 2015). As companies deepen their understanding of the SDGs, this awareness is also reflected in their reporting which serves as the primary means of communicating their current actions and strategies for contributing to the SDGs to stakeholders. In this case, materiality assessment can play a crucial role in shaping SDGs reporting practices and the extent to which stakeholder expectations influence disclosure decisions. A well-executed materiality assessment may strengthen the integration of sustainability within an organization, potentially ensuring that resources are directed toward the most significant SDG-related issues. Through materiality assessments, organizations can validate their priorities, potentially facilitating the effective integration of sustainability into their operations (Beyne and Moratis, 2025).

However, there is a chance that materiality assessment may not achieve its intended consequences, leading to a lack of objective assessment of what information is truly material (Fiandrino *et al*., 2022a) or to a misalignment of priorities between the reporting company and its stakeholders. Two potential reasons may cause the process to fail. First, the concept of materiality is not definitive and objective as it is shaped by the perspectives of different stakeholder groups – it lies in the eye of beholder (Oll et al., 2025). These groups often interpret and apply the notion of materiality in distinct ways, which introduces additional complexity into its practical implementation and reporting processes (Hicks, 1964; Messier *et al*., 2005; Hug and Mohammadrezaei, 2025). According to Puroila and Mäkelä (2019), considerations of materiality have consistently underpinned both the disclosure of sustainability information and the assessment of what is deemed significant, for whom it is significant, what should be reported, and to what extent. Since most reporting standards provide useful guidance but do not establish predetermined content for all companies' reports, firms bear the responsibility of conducting a thorough assessment of their sustainability impacts, with a clear focus on engaging stakeholders to report these impacts effectively. Consequently, the company starts interacting with its stakeholders to exchange information and discuss opinions and expectations, mutually influencing one another (Arenas *et al*., 2009). Materiality is thus socially constructed, with its meaning being developed through a "tense" negotiation between stakeholders and companies (Unerman and Zappettini, 2014, p. 184).

Second, even when a company and its stakeholders agree on which issues are material, and these are reflected in the reporting, the company may still engage in green- or social-washing by making commitments without real action.[1] In such cases, firms may strategically portray themselves as active "engagers" or "listeners" to stakeholders by highlighting issues that are considered material in the materiality matrix, while selectively disclosing information or offering only general commitments. This intention-action gap in the materiality assessment process can influence stakeholder perceptions, helping firms gain legitimacy (Cho et al., 2015), achieve higher sustainability ratings (Baker et al., 2024), or secure better access to finance (Duchin et al., 2025). However, the prevalent existence of such gaps could severely hinder progress toward the 2030 sustainable development targets. Previous research highlights a persistent misalignment between what companies choose to disclose in sustainability reports, and what stakeholders expect or require (Beske *et al*., 2020; Pizzi, 2023; Power, 2009; Puroila and Mäkelä, 2019; Rodrigue *et al*., 2015). The credibility and transparency of reporting are often questioned because disclosed data may not reflect the specific interests of stakeholders, or information is presented in overly broad and generalized terms, thereby reducing their usefulness and impact (Hug and Mohammadrezaei, 2025).

2.2 SDGs and their interconnectedness

SDGs are all deemed of equal importance; therefore, as suggested by the United Nations, they should be implemented as a whole (Weitz *et al*., 2018). However, they are also interconnected. Nilsson *et al*. (2016) provide an example that suggests in less developed communities, using coal to improve energy access (SDG 7 *Affordable and Clean Energy*), would have negative consequences on the climate and ocean life (SDG 13 *Climate Action* and SDG 14 *Life Below Water*) as well as on people's health (SDG 3 *Health and Well-being*). In contrast, the education of girls (SDG 4 *Quality Education*) can contribute to maternal health (SDG 3 *Health and Well-being*), poverty eradication (SDG 1 *No Poverty*), gender equality (SDG 5 *Gender Equality*), and economic growth (SDG 8 *Decent Work and Economic Growth*). There is thus not only a need to be aware of these interactions but also to consider whether they are reversible, move in both directions, and how strong and certain they are. Understanding the characteristics of these interactions bears significance for practical SDG implementation (Nilsson *et al*., 2016).

In the literature, the SDGs' interconnectedness has mainly been analyzed based on a specific SDG and by exploring its links with other SDGs or by focusing on a specific subset of the SDGs (Weitz *et al*., 2018). Few studies have therefore investigated the interactions across all the SDGs (Boas *et al*. 2016; Le Blanc 2015; Nilsson *et al*., 2016). While Nilsson *et al*. (2016) refer to the interdependence of the SDGs as the basis of their logic, this concept is not clearly or precisely defined. That is, the authors analyze the SDGs at the country level and synthesize the interactions among them, identifying their type and whether they are positive or negative. The

[1] A body of research has examined the misalignment between companies' disclosures and their actual practices (performance), providing evidence that corporate "talk" and "walk" may diverge and be disconnected (Wickert *et al*., 2016). Prior studies employed various theories and frameworks to explain and highlight greenwashing practices, including legitimacy theory (Cho and Patten, 2007; Patten; 2002); impression management (Cho *et al*., 2012); frontstage and backstage dynamics (Cho *et al*., 2018); or organized hypocrisy (Cho *et al*., 2015; She and Michelon, 2019). While this research stream is important to consider and acknowledge, the scope and focus of our study are on the intention-action gap, examining the consistency between what the firm commits to (i.e., intention), as portrayed in its materiality matrix, and what the firm actually discloses (i.e., the action of reporting).

authors also note that if countries ignore these overlaps and simply aim to accomplish individual targets, they risk not achieving their intended outcomes. Boas *et al*. (2016) even argue that the connections among the SDGs are random and, in many cases, weak yet rarely transparent. Finally, Le Blanc (2015) uses network analysis to establish the existence of links among the SDGs based on their wording. These findings show that the SDGs are unequally connected; some goals are connected to many others through multiple targets, while other goals are only weakly connected to the rest of the system. For example, two SDGs, SDG 12 *Responsible Consumption and Production* and SDG 10 *Reduce Inequality*, provide critical connections with other goals and thereby render all the SDGs more tightly linked in a network.

Although engagement with the SDGs is often discussed in the context of a particular country, the efforts undertaken by businesses, especially large multinational corporations, are crucial in this process (García-Sánchez *et al*., 2020; Mio *et al.,* 2020). In particular, corporate engagement with the SDGs is strongly connected to corporate accountability, as the SDGs offer a structured framework for companies to align their operations and sustainability initiatives with widely accepted societal goals. By committing to the SDGs, companies publicly express their intention to support sustainable development, thereby creating a level of accountability to their stakeholders (Awuah *et al*., 2023). Nevertheless, implementing SDGs at the corporate level poses practical challenges, particularly given the complex interconnections among the goals. According to Nilsson *et al*. (2018), tracking interconnections among the SDGs is complicated; however, they must be measured not only at the country level but also at the company level. Pradhan *et al.* (2017) note that the SDGs should not be viewed as an additive structure but as a system of synergistic reinforcement. Therefore, achieving the SDGs will largely depend on whether their synergies can be harnessed and on the trade-offs that are identified and resolved. When undertaking efforts toward the SDGs, companies must understand that they are interconnected and how (Fiandrino *et al.,* 2022).

2.3 The role of social media in SDG communication

Social media comprises a group of internet-based applications built on the ideological and technological foundations of Web 2.0, enabling the creation and exchange of user-generated content (Kaplan and Haenlein, 2010). The increasing use of social media contributes to the generation of new information and its rapid dissemination. Their development has significantly influenced how companies disclose information and interact with stakeholders (Bellucci and Manetti, 2017; Manetti and Bellucci, 2016; Manetti *et al*., 2017). The literature emphasizes the growing role of social media platforms as an essential component of corporate disclosure strategies, complementing traditional reporting methods such as financial and sustainability reports (Nicolò and Cervilla-Bellido, 2025). As Unerman and Bennett (2004) noted, social media can contribute to improving accountability systems by providing opportunities to significantly influence the behavior of both companies and stakeholders. While one-way messaging remained the dominant strategy on social media for some time, efforts to foster interaction between corporations and users have become more common (Manetti and Bellucci, 2016).

Social media enhances transparency and allows stakeholders to be recognized as partners and co-creators rather than passive consumers (Chua *et al*., 2012). Stakeholders can utilize social media to interact with a company by offering praise, expressing criticism, questioning its decisions and actions, and even advocating for specific measures. Social media provides a platform for stakeholders to voice their opinions and expectations regarding a company's behavior - not only in response to corporate communications but also as an independent source of information (Dobija *et al*., 2023).

Nerantzidis *et al*. (2024) highlight the potential of social media to enhance data coherence in SDG analysis, providing new opportunities for accounting scholars to explore its role in advancing sustainability goals. Regarding SDGs and the use of social media, De Luca *et al*. (2022) and Mehmood et al. (2022) examined a sample of European GRI adopters and analyzed how they communicate about SDGs on Twitter to determine the impact of SDG-related content in tweets on stakeholder engagement levels. The study revealed that the nature of content in SDG-related posts has a significant impact on stakeholder engagement levels, reflected in metrics such as likes, comments, and retweets. Specifically, SDG 17 *Partnerships for the Goals*, SDG 13 *Climate Action,* SDG 10 *Reduce Inequality*, SDG 14 *Life Below Water*, SDG 15 *Life on Land*, and SDG 5 *Gender Equality* generate higher stakeholder engagement than other SDGs. ElAlfy *et al*. (2020) investigate how and to what extent companies communicate about the SDGs on social media. The study examined over 24,000 SDG-related tweets from Standard and Poor's 500 companies, finding that firms tend to share tweets about SDGs that align with their core business activities and impacts.

Manetti *et al*. (2017) emphasize that social media can help refine the understanding of materiality and the relevance of information. In the materiality assessment process, both the company's perspective and stakeholder needs and expectations are crucial (Pizzi *et al*., 2024; Puroila and Mäkelä, 2019). However, none of the studies cited above analyzed how stakeholders use social media to express concerns regarding SDG-related issues. Against this backdrop, the present study addresses this gap by examining how social media can serve as a source of data for companies to incorporate into their materiality assessments and analyses of SDG interconnectedness, thereby uncovering and potentially reducing misalignments between corporate SDG disclosures and stakeholder concerns expressed on platforms such as Twitter. Importantly, our study focuses on the subjective evaluation of SDG interconnectedness based on stakeholder perceptions rather than a more objective approach based on public policies or scientific studies. Stakeholder perceptions on interconnected SDGs can turn into strong beliefs that shape their future expectations and actions regarding firm policies. Since materiality assessments are used as a dialogic instrument to enhance stakeholder accountability, it is essential for firms to understand how stakeholders perceive the interconnections among SDGs and to address these expectations through their disclosures.

3. The case background and research method

3.1 The case background

We focus on Nestlé as our case company because it is a leading multinational enterprise that highlights its commitment to societal contribution and global goals (Nestlé, 2023). Nestlé's *Creating Shared Values* (CSV) priorities, launched in 2006, represent key areas where the company's business intersect with societal needs. According to the company, all 17 SDGs are interlinked and integrated within its CSV approach to doing business. Additionally, Nestlé has supported the United Nations (UN) Global Compact as a founding member (Nestlé, 2016).

Nestlé informed in its 2016 sustainability report, *Nestlé in Society. Creating Shared Value and Meeting Our Commitments 2016* (Nestlé, 2016), that to identify the issues that matter most to stakeholders, and to better support reporting and strategic decision-making, the company worked with an independent consultancy and think tank specializing in corporate sustainability. The company conducted a formal materiality analysis at least every two years using a formal materiality process. This analysis required issue identification, assessment of business impact, assessment of stakeholder interest, and review and validation. These results were presented on a materiality matrix, which displayed issue position relative to the degree of stakeholder interest and potential business impact. The company underlined that the elements in the matrix should not be reviewed in isolation, as they were interconnected and impacted each other (Nestlé, 2016). Figure 1 presents the materiality matrix included in Nestlé's 2016 sustainability report. It illustrates how the company organized 17 material topics under five CSV focus areas: nutrition, health and wellness; rural development; water; environmental sustainability; human rights and compliance (Nestlé, 2016). Among the topics identified as particularly significant for both internal and external stakeholders, and as having a substantial impact on the company, are overnutrition, undernutrition, and water stewardship (Nestlé, 2016).

[Insert Figure 1 here]

The company communicated its sustainability strategy intensely on social media, mainly through Twitter[2] handles disclosing nutrition, food security, agriculture and social issues. This social media channel provided information on the company's approach to material issues, as well as the industry initiatives the company participates in, as well as updates concerning live events. Twitter was a core element in Nestlé's overall SDG communications strategy, aimed at delivering reputation-enhancing value to the corporate brand. Some of these communications achieved a high level of stakeholder interaction and engagement (Socialinsider, 2021).

Despite these efforts, the company is constantly criticized for its irresponsible business practices. For example, Nestlé has been used as a case study of unethical conduct due to irresponsible marketing of infant formula in the 1970s (Boyd, 2012), unethical palm oil sourcing (Coombs, 2014), use of child slave labor in chocolate production (Perkiss *et al*., 2021), exploiting drought-ridden areas and natural resources (FairPlanet, 2015), producing plastic pollution (Brand Audit, 2023) and contaminating groundwater (Water Boards, 2019). Moreover, Nestlé has been accused of greenwashing on a large scale (Greenpeace, 2022).

3.2. Data collection and coding procedures

3.2.1. Timeframe of the analysis

We focus on the year 2016 for two reasons. First, 2016 is the first fiscal year after the introduction of the SDGs in 2015. Indeed, Nestlé recognized its contributions to the SDGs by demonstrating their implementation in its CSV approach and stating its support for the UN Global Compact in its 2016 report (Nestlé, 2016). Second, several serious scandals were faced by the company during this sample period, which resulted in fierce discussions among its stakeholders. For example, Nestlé admitted to its use of slavery in Thailand (Business and Human Rights Resource Center, 2016); child labor abuse was occurring at plantations that produce palm oil for this company (Amnesty International, 2016); the investigation revealed that Nestlé extracted spring water from the San Bernadino National Forest to sell as Arrowhead

[2] The research was conducted when Twitter was recognized as one of the important medium of business communication, before the change of ownership and renaming it to X. Therefore, we use Twitter not X, when referring to the source of SM data.

brand bottled water, while California was facing severe droughts (BBC, 2016). Consequently, the tweets related to Nestlé in this period constitute rich material for the analysis of the company's and its stakeholders' discussion related to the SDGs.

3.2.2. Nestlé's sustainability report data collection

To analyze the materiality portrayed by Nestlé related to the SDGs, we use the company's 2016 sustainability report, *Nestlé in society. Creating Shared Value and Meeting Our Commitments 2016* (Nestlé, 2016). The text is extracted from the report, parsed into sentences, and imported into the open-source statistical package R for subsequent analysis. A total of 907 sentences were extracted from the report. We rely on the SDG Keywords Dictionary developed by Wang *et al.* (2023) and the SDG Research Publication Keywords developed by Mistry and Sellers (2020) to classify the SDG-related disclosures in Nestlé's sustainability report.[3] The main reason for using multiple dictionaries is that, given the diverse topics covered in SDGs, it is challenging for a single dictionary to capture all related information. Hence, combining multiple dictionaries allows us to more accurately identify SDG disclosures. Since these keywords are developed using Elsevier's Scopus SDG search query and documentation provided by the Sustainable Development Solutions Network (SDSN) and the UN, they are believed to be appropriate lists for identifying SDG-related text in corporate reports (i.e., a formal document produced by firms). Furthermore, with data support from Elsevier, SDSN and UN, these dictionaries are considered comprehensive for SDG-related research. Both dictionaries have also been used in prior literature to identify SDG-related information in texts (Berrone *et al*., 2023; Wulff *et al*., 2024). By combining both lists and keeping district terms, our final dictionary thus contains 2,321 SDG-related terms, covering all 17 SDG subtopics.

To identify and classify Nestlé's SDG-related disclosures, we loop through each sentence to search for terms that match our SDG dictionary. We define a sentence as SDG-related if it contains one or more terms from the dictionary and zero otherwise. Once classification is completed, we compile these sentences for our network analysis and materiality matrix construction. Some examples of SDG-related information are provided in Appendix 1.

3.2.3. Twitter data collection

We analyzed 33,672 stakeholder tweets related to the corporate Twitter handle of Nestlé (@Nestlé), composed in English and published in 2016. The tweets were purchased in December 2020 from *Vicinitas,* which offers in-depth analytics on social media. While many prominent studies have used text mining and other computer-based textual analysis tools to classify tweets (e.g., She and Michelon, 2019), we adopted a manual coding procedure to analyze the additional data revealed in tweet content (e.g., hashtags or hyperlinks) and accurately categorize the focal tweets. Manual coding was also necessary as our SDG dictionary is less accurate in informal texts such as social media posts. Two independent research assistants conducted manual coding between December 2020 to August 2021. They first assessed the subject matter of a sample of tweets and classified them into the 17 SDG subtopics according to the clear coding instructions, which included definitions and examples for each of the 17 SDGs, criteria for inclusion and exclusion, and rules for handling ambiguous or multi-themed tweets. Coders were also instructed on how to interpret hashtags, hyperlinks, and media

[3] The University of Auckland SDG Keywords Mapping is downloadable at https://www.sdgmapping.auckland.ac.nz/. The SDG Research Publication Keywords is downloadable at https://doi.org/10.25392/leicester.data.12839519.v1.

content, and how to document their decisions. We then compared the results to identify any differences which were then discussed between coders and the research team until an intercoder reliability threshold of 90% was achieved. Subsequently, the research assistants were each assigned a subsample of tweets to implement the agreed-upon coding refinements in the dataset. This step was undertaken to ensure consistency, reliability, and validity of the final coding. Each assistant received a subsample comprising half of the total number of tweets designated for manual coding. To ensure an unbiased and representative distribution, a sequential assignment method was employed: tweets were ordered chronologically and alternately allocated to each assistant, resulting in two balanced subsamples. SDGs were not coded as mutually exclusive, i.e., a single tweet could mention more than one SDG. This approach enabled us to identify the potential interconnections among the SDGs. In total, we identified 19,644 tweets containing stakeholder communication regarding the SDGs. The most frequently discussed themes were associated with SDG 12 *Responsible Consumption and Production* and SDG 6 *Clean Water and Sanitation* while no tweets references SDG 1 *No Poverty*, SDG 9 *Industry, Innovation and Infrastructure*, or SDG 10 *Reduced Inequalities*. Examples of this coding are provided in Appendix 2.

3.3. Research design

We used computerized textual analysis to develop the materiality matrix and analyze and compare the interconnectedness between SDGs that are discussed by both Nestlé and stakeholders. Detailed information on the methodologies used is presented below.

3.3.1. Materiality matrix analysis

We employ materiality matrix analysis to examine the differences between the materiality matrix presented by Nestlé in its 2016 sustainability report and the material topics communicated by stakeholders on social media. The materiality matrix is a useful tool to visualize the relative importance of a topic to both the firm and its stakeholders. In a materiality matrix, the x-axis represents how a topic is considered important to the firm, and the y-axis represents a topic's importance to stakeholders. Topics plotted in the top-right section of a materiality matrix are considered highly material to both the firm and its stakeholders, while issues placed in the bottom-left are considered less material. Following this approach, we analyze the differences between what Nestlé considers material, through its disclosures in the 2016 sustainability report, and what its stakeholders consider material, using their social media communications.

To analyze topics that are considered material by Nestlé, we first compiled the Nestlé sustainability report data (as discussed in section 3.2.2) to compute the total number of sentences discussing SDGs in the report. Next, we count the number of sentences discussing each of the 17 SDGs and then divide it by the total number of sentences discussing SDGs to compute the weight of each SDG disclosure in the report. However, we find the distribution of SDG topics heavily skewed, where some SDGs received minimal attention from the firm, while others constitute a large proportion of the communication. The uneven distribution caused some SDG topics to concentrate in the bottom left corner of a materiality matrix, making it difficult to visualize and interpret the pattern. To address this issue, we standardize each SDG percentage by dividing the percentage of individual SDG disclosed by the sum of percentages of all 17 SDG disclosures ($SR\_STD\_Percent\_SDG_i$). This technique allows us to calculate the relative proportion of an SDG disclosure compared to all SDG disclosures.

$$SR\_STD\_Percent\_SDG_i = \frac{Percent\_SDG_i}{\sum_i^{17} Percent\_SDG_i} \times 100$$

where i indicates SDG i and $Percent\_SDG_i$ is the percentage of sentences mentioning SDG i scaled by the sum of percentages of all 17 SDGs reported by Nestlé in 2016.

To analyze topics that are considered material by stakeholders, we repeat the above steps by firstly compiling social media data (as discussed in Section 3.2.3) and then dividing the percentage of individual SDG communicated by the sum of percentages of all SDG communicated ($SM\_STD\_Percent\_SDG_i$):

$$SM\_STD\_Percent\_SDG_i = \frac{Percent\_SDG_i}{\sum_i^{17} Percent\_SDG_i} \times 100$$

where i indicates SDG i and $Percent\_SDG_i$ is the percentage of tweets mentioning SDG i scaled by the sum of percentages of all 17 SDGs tweeted by stakeholders in 2016.

Finally, we convert both constructed variables into coordinates where the x-axis represents the standardized percentage of sentences discussing SDG topics in Nestlé's 2016 sustainability report, and the y-axis represents the standardized percentage of SDG tweets posted by stakeholders and plot them into a coordinate grid:

$$Materiality\_Coordinates = (SR\_STD\_Percent\_SDG_i\,, SM\_STD\_Percent\_SDG_i)$$

3.3.2. Interconnectedness analysis

We perform social network analysis to explore and compare the interconnectedness of the SDGs presented by the stakeholders on Twitter and that portrayed by Nestlé in its 2016 sustainability report. Social network analysis is a method that originates from graph theory, identifying nodes and edges within a social network (Freeman, 1977; Sabidussi, 1966). Social network data can be represented either numerically in the form of a matrix or graphically as a sociogram. When presenting social networks in a sociogram format, the actors, either human or non-human objects, are shown as labeled circles (nodes), and the relationships among them (edges) are presented as arrows (directed) or lines (undirected). The intensity of the relationships among the nodes is indicated by line thickness (edge width). Social network analysis is widely used in accounting and finance research to identify personal (e.g., board directors) networks (Duong *et al.*, forthcoming; Larcker *et al.*, 2013) and to analyze the discursive structure of textual corpora and reveal connections between accounting concepts and topics (Neu and Saxton, 2023; Saxton and Neu, 2022). Social network analysis is therefore appropriate for this study because it allows us to examine the interconnections among the SDGs portrayed by the stakeholders and Nestlé.

In our empirical setting, the nodes are defined as the SDGs communicated by the stakeholders and Nestlé, and the edges represent the interconnectedness among the SDGs. Following prior studies (Neu and Saxton, 2023; Saxton and Neu, 2022), we code an edge as one, and zero otherwise, when a tweet or a sustainability report sentence contains more than one SDG (the nodes). For example, a stakeholder tweet mentioning SDG 12 *Responsible Consumption and Production* and SDG 13 *Climate Action* would create an SDG 12 *Responsible Consumption and Production*-SDG 13 *Climate Action* edge. Consistent with the approach of Neu and Saxton

(2024), we use the *igraph* package in R to construct separate SDG communication networks for the stakeholder tweet dataset and for Nestlé's sustainability report.

In addition to this graphical representation of SDG interconnectedness, social network algorithms provide both a graphical representation and quantitative measures of centrality. Centrality refers to a set of measures that reflect a node's position in a network relative to the other nodes (Borgatti, 2005). Nodes that are more central appear in the center of a graph, and those that are peripheral appear away from the center. In addition, the distance between each pair of nodes reflects the degree of co-occurrence thereof in the document corpus (Borgatti, 2005; Neu and Saxton, 2023; Saxton and Neu, 2022). In other words, the SDGs that are more likely to be discussed alongside an SDG appear closer to that SDG in the network. Consequently, the measure of centrality can reveal more insights into the network characteristics embedded in SDG communications.

We employ both graphical representation and quantitative measures to capture the centrality of each SDG communicated by the stakeholders and Nestlé, reflecting the perceived materiality by each party. Consistent with prior studies (Borgatti, 2005; Neu and Saxton, 2024; Saxton and Neu, 2022), we measure centrality using numerous metrics: degree, betweenness, closeness, and eigenvector. Degree centrality (*Degree*) indicates the number of direct ties a node has with other nodes in the network. For example, people who have many followers on Twitter are considered to have a higher degree of centrality (Iacobucci *et al*., 2017). Betweenness centrality (*Betweenness*) measures how often a node resides on the shortest path between any other two nodes of the network. The betweenness position of a node in the network represents how much control this node can have on the information flow to other nodes. Closeness centrality (*Closeness*) indicates how closely a node is interconnected to many other nodes in the network. In other words, *Closeness* not only captures the number of direct ties but also reveals those close to each other. Eigenvector centrality (*Eigenvector*) represents the power and prestige of a node in the network. A node is defined as well-connected if it holds connections with other nodes that are themselves well-connected (Borgatti, 2005; Iacobucci e*t al*., 2017). In other words, a node, even if it has higher degrees, cannot be defined as having high eigenvector centrality if its connected nodes are isolated from the remaining nodes in the network (Borgatti, 2005). Accordingly, while we present statistics of all centrality measures in this study, we rely on the *Eigenvector* as the centrality measure in generating our social network maps, as this measure considers the degree as well as the prestige of a node in the network (Larcker *et al*., 2013). Last, because stakeholders and Nestlé may repeatedly reference SDGs on Twitter and in sustainability reports, we measure the intensity of relationships among SDGs by counting the number of times two or more SDGs are mentioned together during the sample period. More frequent joint mentions between SDGs are represented by thicker edges between nodes.

4. Main Findings

4.1.Materiality matrices comparison

Table 1 presents the materiality matrix constructed by comparing stakeholders' SDG-related communications on Twitter with the SDG disclosures in Nestlé's 2016 sustainability report. Columns 2 and 3 show the number of sentences and the standardized percentage of mentions for each SDG in the report. The three most frequently disclosed SDGs by Nestlé are SDG 12 *Responsible Consumption and Production* (15.108%), SDG 2 *Zero Hunger* (10.252%), and SDG 3 *Good Health and Well-being* (10.252%). Conversely, the least discussed SDGs are SDG

9 *Industry, Innovation and Infrastructure* (0.36%), SDG 14 *Life Below Water* (1.439%), and SDG 7 *Affordable and Clean Energy* (1.978%).

Stakeholders' perceptions of materiality, as reflected in Columns 4 and 5, reveal some alignment but also notable divergences. While SDG 12 Respo*nsible Consumption and Production* is considered the most material topic by stakeholders (38.353%)—consistent with its prominence in Nestlé's disclosures—other highly prioritized topics include SDG 6 *Clean Water and Sanitation* (32.697%), SDG 13 *Climate Action* (10.396%), and SDG 15 *Life on Land* (10.284%). Among these, only SDG 6 receives some attention in Nestlé's report, while the latter two are underrepresented.

Moreover, stakeholders show little to no engagement with SDG 7 *Affordable and Clean Energy*, SDG 9 *Industry, Innovation and Infrastructure*, and SDG 10 *Reduced Inequalities*, as these topics were scarcely, if ever, mentioned in tweets during the sample period. The lack of stakeholder interest in SDG 7 and SDG 9 aligns with Nestlé's limited disclosures. However, Nestlé does provide some coverage of SDG 10, despite its absence from stakeholder discussions *Reduce Inequality*.

[Insert Table 1 here]

The misalignment between stakeholders' SDG-related communications on Twitter, Nestlé's SDG disclosures, and the materiality matrix presented in its 2016 sustainability report becomes even more apparent when we plot Table 1 data in a materiality matrix. Figure 2 presents the materiality matrix plotted using the standardized percentages of SDG tweets displayed in Table 1.

When comparing this matrix to the one provided in Nestlé's sustainability report (Figure 1), some points of convergence and divergence emerge. Notably, both matrices emphasize the significance of SDG 12 *Responsible Consumption and Production.* In Nestlé's report, this is reflected through the classification of topics such as *Responsible Sourcing and Traceability*, and *Resource Efficiency*, *Waste, and Circular Economy* (part of SDG 12) as highly material, possibly influenced by the company's public admission of using forced labor in its supply chain in Thailand.

However, discrepancies also stand out. For instance, while Nestlé's materiality matrix suggests that *Water, Sanitation, and Hygiene* are of relatively low stakeholder interest, these issues receive substantial attention on Twitter - particularly in the context of controversies surrounding Nestlé's water extraction practices. Paradoxically, Nestlé rates *Water Stewardship* as both high in stakeholder interest and as having a major impact on the business, yet it provides limited disclosure related to SDG 14 *Life Below Water*. Moreover, there is a notable divergence in the perceived materiality of SDG 2 *Zero Hunger* and SDG 3 *Good Health and Well-being*. While Nestlé's matrix classifies topics such as *Over- and Undernutrition* and *Food and Nutrition Security* as highly material to stakeholders, Twitter communications suggest these SDGs are not considered central by external audiences.

The observed discrepancies suggest two distinct dimensions that warrant analytical separation. First, they may reflect a lack of meaningful stakeholder engagement constructing the materiality matrix. Nestlé appears to strategically use the materiality assessment to justify the content of its sustainability report, without adequately considering the priorities of legitimized stakeholder groups (Beske *et al*., 2020; Farooq *et al*., 2021; Manetti and Bellucci, 2016). This suggests a limited or superficial understanding of stakeholder expectations and priorities. Second, the discrepancies may stem from Nestlé's attempt to present a positive corporate image. Issues that enhance the company's reputation for responsibility are classified as high-impact and placed in the top-right corner of the matrix, whereas areas with limited progress are downplayed and considered less important. This strategic framing is further evidenced comparing Nestlé's SDG disclosures with its 2016 materiality matrix. Although many SDGs are positioned as highly material, actual reporting on these goals is relatively sparse. This inconsistency, illustrated by the clustering of SDGs in the bottom-left corner of the self-constructed matrix, suggests a symbolic use of materiality as a legitimacy mechanism (Cho *et al.,* 2015; 2018; She & Michelon, 2019; Wickert *et al*., 2016), where Nestlé employs a 'talk' strategy to signal awareness without engaging in substantive action.

[Insert Figure 2 here]

4.2. Interconnectedness of the SDGs portrayed by Nestlé

We also map the interconnectedness of the SDGs disclosed by Nestlé in its 2016 sustainability report. Figure 3 shows a core of six nodes and an outside peripheral ring consisting of ten nodes. The materiality core mainly contains social-related SDGs (i.e., SDG 2 *Zero Hunger*, SDG 5 *Gender Equality*, SDG 6 *Clean Water and Sanitation*, SDG 8 *Decent Work and Economic Growth*, SDG 12 *Responsible Consumption and Production* and SDG 16 *Peace, Justice and Strong Institutions*), while environmental-related SDGs (e.g., SDG 13 *Climate Action*, SDG 14 *Life Below Water*, and SDG 15 *Life on Land*) are more peripheral. Interestingly, SDG 9 *Industry, Innovation and Infrastructure* is quite an isolated topic in the network, as it is only connected to SDG 3 *Health and Well-being*, SDG 11 *Sustainable Cities and Communities*, SDG 12 *Responsible Consumption and Production*, and SDG 13 *Climate Action*. This is possibly due to the nature of this topic, as information related to *Industry, Innovation and Infrastructure* is more likely to be discussed in the business model section of a firm's annual report than in its sustainability report. However, its connections with *Health and Wellbeing*, *Sustainable Cities and Communities*, *Responsible Consumption and Production*, and *Climate Action* indicate that the firm believes that the advancement of innovations and the construction of necessary infrastructure are key to meeting its SDG commitments. Another highlight in the map is that while all the SDGs are interconnected, the intensity of their interconnections varies to a certain extent. For example, SDG 11 *Sustainable Cities and Communities*-SDG 12 *Responsible Consumption and Production*-SDG 13 *Climate Action*; SDG 5 *Gender Equality*-SDG 10 *Reduce Inequality*-SDG 16 *Peace, Justice and Strong Institutions*; and SDG 2 *Zero Hunger*-SDG 12 *Responsible Consumption and Production* are strongly connected (as represented by the width of edges). The strong interconnectedness among SDG 11 *Sustainable Cities and Communities*, SDG 12 *Responsible Consumption and Production*, and SDG 13 *Climate Action* suggests that Nestlé underscores the development of sustainable cities and communities and that actions to address climate change must heavily rely on businesses' commitments to adopt a more responsible consumption and production model. Similarly, the intensive relationships between SDG 5 *Gender Equality*, SDG 10 *Reduce Inequality* and SDG 16 *Peace, Justice and Strong Institutions* indicate an inherent link among gender equality, social inequality, and social justice.

[Insert Figure 3 here]

We also use various centrality measures to test interconnectedness. Table 2 shows that SDG 2 (*Zero Hunger*), SDG 3 (*Health and Well-being*), SDG 5 (*Gender Equality*), SDG 10 (*Reduce Inequality*), SDG 11 (*Sustainable Cities and Communities*), and SDG 12 (*Responsible*

Consumption and Production) are central to the network when measured using *Degree* and *Eigenvector*. *Betweenness* shows that SDG 3 (*Health and Well-being*), SDG 11 (*Sustainable Cities and Communities*), and SDG 12 (*Responsible Consumption and Production*) frequently lie on the shortest path between any other two nodes of the network, suggesting that these goals act as bridges connecting one part of the network to another. In other words, Nestlé may consider these SDGs as playing a facilitating role in linking its SDG commitments. Finally, *Closeness* indicates that most of the SDGs are closely interconnected with each other, suggesting that Nestlé does not consider them in isolation.

[Insert Table 2 here]

4.3. Interconnectedness of the SDGs portrayed by stakeholders

Figure 4 depicts the interconnectedness of the SDGs communicated by stakeholders on Twitter. As indicated in the map, the stakeholders consider fewer SDGs material on Twitter. The map shows a core of seven nodes and an outside peripheral ring consisting of five nodes. Unlike Nestlé, the materiality core of the stakeholders consists of both social- and environmental-related SDGs. More interestingly, the stakeholders consider SDG 12 *Responsible Consumption and Production* and SDG 6 *Clean Water and Sanitation* the center of the network. This was likely caused by Nestlé's water scandal, where it extracted 36 million gallons of water from the San Bernardino National Forest to bottle and sell as Arrowhead water, while California was experiencing severe drought in 2016. Moreover, unethical practices, such as its use of slavery and child labour abuse, were revealed during the search period. In contrast to Nestlé, which deems nearly all the SDGs interconnected, here, SDG 5 *Gender Equality*, SDG 11 *Sustainable Cities and Communities*, SDG 14 *Life Below Water*, SDG 16 *Peace, Justice and Strong Institutions*, and SDG 17 *Partnerships for the Goals* are only connected to certain nodes. For example, SDG 11 *Sustainable Cities and Communities* is only connected to SDG 12 *Responsible Consumption and Production* and SDG 15 *Life on Land*, suggesting that the stakeholders believe the development of sustainable cities and communities should account for their potential impacts on biodiversity. The intensity of interconnections also indicates that SDG 6 *Clean Water and Sanitation*, SDG 12 *Responsible Consumption and Production*, SDG 13 *Climate Action*, and SDG 15 *Life on Land* are strongly connected. Their relationship intensity is, however, different from that disclosed by Nestlé, as SDG 6 *Clean Water and Sanitation* and SDG 15 *Life on Land* are more peripheral in Nestlé's network.

[Insert Figure 4 here]

Similarly, we also use various centrality measures to examine interconnectedness and find in Table 3 that SDG 2 *Zero Hunger*, SDG 3 *Health and Well-being*, SDG 6 *Clean Water and Sanitation*, SDG 8 *Decent Work and Economic Growth*, SDG 12 *Responsible Consumption and Production*, SDG 13 *Climate Action*, and SDG 15 *Life on Land* have the greatest number of ties with other nodes and are influential in the network using *Degree* and *Eigenvector*. *Betweenness* suggests that the stakeholders consider SDG 12 *Responsible Consumption and Production* and SDG 13 *Climate Action* as the bridge connecting other SDG groups. Last, *Closeness* shows that SDG 2 *Zero Hunger*, SDG 3 *Health and Well-being*, SDG 6 *Clean Water and Sanitation*, SDG 8 *Decent Work and Economic Growth*, SDG 12 *Responsible Consumption and Production*, SDG 13 *Climate Action*, and SDG 15 *Life on Land* are more closely connected to each other.

[Insert Table 3 here]

Table 4 presents the comparison of the intensity of interconnectedness among the SDGs communicated by the stakeholders and Nestlé. Consistent with the above sociograms, there is an inconsistency between the SDG interconnectedness communicated by Nestlé and by the stakeholders. For example, in Nestlé's 2016 sustainability report, SDG 11 *Sustainable Cities and Communities*-SDG 12 *Responsible Consumption and Production*, SDG 5 *Gender Equality*-SDG 10 *Reduce Inequality*, SDG 5 *Gender Equality*-SDG 16 *Peace, Justice and Strong Institutions*, and SDG 10 *Reduce Inequality*-SDG 16 *Peace, Justice and Strong Institutions* are the most discussed connections. However, SDG 11 *Sustainable Cities and Communities*-SDG 12 *Responsible Consumption and Production* is barely discussed by stakeholders, with only one tweet mentioning this connection, and there are zero tweets referring to SDG 5 *Gender Equality*-SDG 10 *Reduce Inequality*, SDG 5 *Gender Equality*-SDG 16 *Peace, Justice and Strong Institutions*, and SDG 10 *Reduce Inequality*-SDG 16 *Peace, Justice and Strong Institutions*. In contrast, SDG 6 *Clean Water and Sanitation*-SDG 12 *Responsible Consumption and Production*, SDG 6 *Clean Water and Sanitation*-SDG 13 *Climate Action*, SDG 6 *Clean Water and Sanitation*-SDG 15 *Life on Land*, SDG 12 *Responsible Consumption and Production*-SDG 13 *Climate Action*, SDG 12 *Responsible Consumption and Production*-SDG 15 *Life on Land*, and SDG 13 *Climate Action*-SDG 15 *Life on Land* are the most discussed connections by stakeholders on Twitter.

The findings above reveal some interesting observations. First, Nestlé seems to devote extensive discussions on the interconnectedness between social issues, such as zero hunger, gender equality, reducing inequality, and peace, justice and strong institutions. In contrast, stakeholders on social media have extensive discussions on interconnected environmental issues, for example, clean water, climate change, and life on land (i.e., biodiversity). Again, we interpret the discrepancy between these two sets of interconnected SDGs as a potential legitimation strategy (Cho *et al.*, 2015; Manetti and Bellucci, 2016; She and Michelon, 2019) where Nestlé emphasizes its positive roles in linking poverty, inequality, and peace and ethics, either because focusing on these issues will improve its reputation or significant progress has been made on these issues, while downplaying its contributions to interconnected environmental (negative) impacts. For example, climate change may cause extreme weather conditions, which led to severe drought in California in 2016. At the same time, Nestlé used water resources irresponsibly, which posed significant impacts to local residents and species. The interconnectedness of the SDGs communicated by stakeholders may thus provide a more relevant picture of the issues that Nestlé should tackle with regard to sustainable development, at least in the timeframe of 2016. Overall, our results confirm that Nestlé and its stakeholders perceive SDG interconnectedness differently, with interconnections presented by stakeholders likely more relevant in a given period.

[Insert Table 4 here]

5. Additional analysis according to stakeholder groups

In the analysis above, we treat stakeholders as a homogenous group to analyze their perceptions of SDG materiality and the interconnectedness of SDGs communicated on Twitter. However, numerous studies argue that stakeholder groups can vary in their degrees of salience, power, and legitimacy (Fassin, 2009; Mitchell *et al.*, 1997) and thus can exert different influences and pressures on an organization, resulting in different types of information being disclosed (see den Hond and De Bakker, 2007; Mitchell *et al.*, 1997). Moreover, stakeholder groups often have distinct agendas and demands, which can be divergent and even conflicting (Phiri *et al.,* 2019). Accordingly, it is necessary to understand how the materiality of SDG topics, as well as their interconnected topics, are considered differently across various stakeholder groups. Shedding light on this aspect enables firms to more comprehensively identify any mismatches between the issues prioritized by the firm and those considered important to individual stakeholder groups, allowing firms to address different information needs. Accordingly, we categorize the stakeholders into four distinct groups: *stakeowners, stakewatchers, stakekeepers, and stakeseekers*, proposed by Fassin (2009; 2012) and Holzer (2008). We define *stakeowners* as a group that holds a legitimate claim and exerts power and influence on a firm that treats them with respect and fairness. Their claims are considered inherently legitimate because they are directly involved in or affected by the firm's operations; as such, they are loyal partners who pursue mutual benefits and rightfully hold a stake in the firm. *Stakewatchers* are pressure groups that derive legitimacy from the stakeowners they represent to influence corporate decision-making. *Stakekeepers* include independent monitors and regulators who lack a stake in a company but impose controls or regulations. *Stakeseekers* are actors who attempt to influence corporate decisions without holding any stake in the company. We present our additional analysis in supplementary materials. Overall, our results demonstrate significant heterogeneity among these different stakeholder groups regarding SDG materiality and their interconnectedness. More specifically, our analysis indicates that some SDGs (e.g. SDG 4, SDG 7, SDG 9, and SDG 10) are rarely mentioned by stakeholders, while others (e.g. SDG 11, SDG 16, and SDG 17) are discussed only by certain stakeholder groups. This suggests that stakeholder perceptions on SDG materiality and interconnectedness are closely aligned with Nestlé's core business model in food production. Issues such as education, affordable energy, and reducing inequalities are considered less relevant and consequently, receive limited attention from stakeholders.

6. Discussion and conclusion

6.1. Discussion of the study findings

Over the past two decades, sustainable development has gained global recognition, especially with the adoption of the 2030 Agenda and its 17 SDGs. To maximize the efforts, the private sector was involved in achieving the SDGs and communicating transparently about the results. SDGs "provide a framework for companies to strategically align their operations and sustainability efforts with socially accepted goals" (Awuah *et al.*, 2023, p. 618). By SDGs reporting, companies are publicly declaring their contribution to sustainable development in line with their stakeholders' priorities.

To effectively contribute to the SDGs, however, companies must go beyond reporting and engage in more deliberate processes of assessment and alignment. For companies, the SDGs present both opportunities and responsibilities. Businesses must engage in structured assessments to determine which sustainability issues are most material to their operations and stakeholders. Moreover, understanding interactions between various SDGs could also help in decisions about the choice which sustainability-related strategy a company wishes to follow. In this study, we investigated how materiality assessment and the comparative analysis of interconnectedness could help to uncover misalignments between corporate and stakeholders' priorities.

The evidence from our empirical investigation presents a picture of Nestlé's SDG reporting that is not fully aligned with its stakeholders' views. The findings indicate that the materiality matrix presented by the case company differs from the one constructed based on the company's communication in the report and stakeholders' perceptions of material issues as reflected in their discussions on Twitter. For instance, while the company and stakeholders in general agree on the importance of SDG 12 *Responsible Consumption and Production*, SDG 6 *Clean Water and Sanitation* seems to be far more important to the stakeholders than visualized in Nestlé's materiality matrix. Similarly, the nutrition over- and undernutrition topics seem to be considered crucial in the materiality matrix presented by Nestlé, but our tweets analysis suggests that while this topic is discussed by stakeholders, they consider it less important. We have also observed some differences in the perceptions of the importance of various SDGs by different groups of stakeholders. The discrepancies between Nestlé's reported materiality matrix and the stakeholder materiality matrix may indicate limited stakeholder engagement in the materiality assessment process. This suggests that Nestlé strategically employs materiality assessment to justify report content while not fully addressing the stakeholder priorities (Beske *et al*., 2020; Farooq *et al*., 2021; Manetti and Bellucci, 2016). The above finding leads to the question of whether the potential of the materiality assessment, as a discussion platform and an opportunity for companies to conduct meaningful dialog with stakeholders, has been fully realized. In other words, do organizations take this type of exercise seriously, or is it merely another organizational façade? (Cho *et al*., 2015). For materiality assessments to effectively contribute to a vision of sustainable development, companies and stakeholders must engage in meaningful dialog about the SDGs. Expanding the scope of analysis by incorporating data from a broader range of stakeholders and diverse sources, including social media, may enhance the depth and relevance of these assessments.

In this study, we also analyzed and compared the interconnectedness across different SDGs. The results enabled us to identify how Nestlé and its stakeholders perceive the linkages among the SDGs. Similar to the materiality assessment, our analysis revealed distinct understandings of interconnectedness between the company and its stakeholders. By analyzing the disclosures in the sustainability report, we were able to identify two sets of interconnected SDGs in Nestlé's discussion: a nexus of SDG 5 *Gender Equality,* SDG 16 *Peace, Justice and Strong Institutions* and SDG 10 *Reduce Inequality* and a nexus of SDG 3 *Health and Well-being*, SDG 11 *Sustainable Cities and Communities*, SDG 12 *Responsible Consumption and Production* and SDG 13 *Climate Action*. Interestingly, the stakeholders, in their Twitter communications, reveal interconnections among SDG 6 *Clean Water and Sanitation*, SDG 12 *Responsible Consumption and Production*, SDG 13 *Climate Action* and SDG 15 *Life on Land*. Additional analysis has revealed that although the SGD 12 *Responsible Consumption and Production* is centrally located in the discussions of different stakeholder groups, each group envisions a discrete nexus of its interconnected SDGs. These empirical results lead us to an important observation. The UN Global Compact Action Platform Blueprint for SDG Leadership sees the SDGs as interconnected and urges work toward all 17 goals: "The SDGs are deeply interconnected – a lack of progress on one goal hinders progress on others" (UN Global Compact, 2023). This quote highlights the importance of making progress on all 17 SDGs to ensure the world is on track to meet them. Nestlé adheres to these guidelines and emphasizes its contributions toward all 17 SDGs in its sustainability report. However, the social network analysis of Nestlé's disclosures in this report, along with its stakeholders' communications on Twitter, revealed varying perceptions of interconnectedness among the SDGs. More importantly, the analysis of Nestlé's or stakeholder communications shows that not all 17 goals are interconnected, either in the company's disclosures or in stakeholder discussions. Each identified nexus comprises only a limited number of SDGs, although the specific composition varies across cases. Therefore, social network analysis helps reveal which SDG nexuses are most frequently emphasized in corporate and stakeholder discourse.

On a more general level, the analysis confirms that materiality assessments are not merely technical exercises—they are strategic instruments that influence how companies frame and communicate their sustainability disclosures. When the design of the materiality process fails to reflect stakeholder diversity, it risks prioritizing corporate perspectives at the expense of external stakeholder concerns (Cho *et al.,* 2015; Cerbone and Maroun, 2020). To mitigate this, companies are encouraged to complement science-based and internal assessments with broader, more inclusive engagement mechanisms that capture stakeholder values. However, accessing diverse stakeholder perspectives through traditional channels can be challenging. This highlights the importance of incorporating alternative data sources—particularly social media—into materiality analyses. Social media offers real-time, unfiltered stakeholder insight, enabling more dynamic and participatory processes in which sustainability priorities are co-constructed. By doing so, companies can foster greater legitimacy, responsiveness, and alignment with societal expectations.

6.2. Contributions to the corporate sustainability literature

This study contributes to the literature on corporate sustainability and stakeholder engagement, providing a critical reappraisal of materiality assessment in the context of SDG interconnectedness. While materiality assessments are often positioned as strategic tools for aligning corporate sustainability priorities with stakeholder expectations (Beyne and Moratis, 2025), our findings challenge this assumption by demonstrating their limited ability to account for the systemic, networked nature of sustainable development. By uncovering the misalignment between corporate disclosures and stakeholder discourse surrounding the SDGs, the study calls for the adoption of a more relational, inclusive, and dynamic approach to materiality assessment—one that more effectively captures the complexity and urgency inherent in contemporary sustainability challenges. Moreover, it demonstrates how stakeholder-driven insights, particularly those sourced through social media, can support more inclusive corporate sustainability strategies. The study also addresses a notable gap in the literature on SDG interconnectedness at the company level, an area that has largely been examined at national or global scales. By drawing attention to how stakeholders perceive interlinkages between SDGs, this paper offers a fresh lens through which companies can assess the broader implications of their sustainability efforts. At a broader level, it supports the growing body of literature calling for a revision of materiality assessments to more accurately capture stakeholder expectations (Guidi *et al*., 2025).

A central contribution of this study lies in its demonstration of how social media can serve as both a communication tool and an analytical resource. Whereas traditional reporting mechanisms often rely on structured surveys or expert interviews – frequently representing a narrow subset of stakeholder voices – social media platforms open access to a wider array of perspectives. Tweets related to sustainability allow companies to identify emerging concerns and themes as they evolve in public discourse. This dynamic engagement not only strengthens materiality assessments but also helps bridge the gap between corporate disclosures and societal priorities. In this way, the study builds on the work of Dey and Gibbon (2014), Vinnari and Laine (2017), and Puroila and Mäkelä (2019), who emphasize the importance of dialogic and participatory approaches to sustainability accounting.

Using stakeholder tweets and Nestlé sustainability report as an empirical setting, the study also provides illustrations on the use of social network analysis to examine perceived interconnections among SDGs. While commonly used in research to analyze personal and discursive networks (Duong *et al*., forthcoming; Larcker *et al*., 2013; Neu and Saxton, 2024), this method is employed here in a novel way to map SDG linkages as understood by both corporations and their stakeholders. Visualizing these connections offers companies a more nuanced understanding of how their sustainability focus areas intersect. This approach opens new possibilities for both academic research and practical application, particularly in the context of strategy development, impact measurement, and integrated reporting.

6.3. Practical contributions

On a practical level, this study illustrates how companies can identify stakeholders' key concerns based on social media discourse. This aligns with prior studies suggesting that social media facilitates corporate–stakeholder dialogue (Bellucci and Manetti, 2017; Manetti and Bellucci, 2016; Manetti *et al*., 2017). By combining insights from social media with those derived from more traditional sources, organizations can construct more robust and representative materiality matrices. From a policy standpoint – both within organizations and in regulatory environments – there is a pressing need to reposition materiality assessment as a strategic instrument that drives long-term value creation, stakeholder trust, and systemic risk management. Simultaneously, greater attention to SDG interlinkages can help businesses move toward integrated thinking. Recognizing positive interactions could help optimize outcomes, reduce redundancies, and unlock opportunities for innovation. Conversely, acknowledging negative interactions could allow firms to better anticipate and manage potential conflicts or trade-offs. Existing sustainability reporting frameworks should move beyond listing material issues and encourage companies to explicitly identify and disclose the interconnections among SDGs. This could take the form of SDG network maps, trade-off analyses, or scenario-based disclosures.

6.4. Limitations and future research

As with all research, this study has limitations. The stakeholder perspective was derived solely from Twitter, meaning that voices of individuals or groups not active on this platform may have been excluded. Additionally, while social network analysis effectively visualized connections among the SDGs, it did not capture the depth or nature of these interlinkages. The analysis was limited to a single company and focused on a specific year. Thus, the findings represent a snapshot rather than a longitudinal view.

Future research could build on this study by employing qualitative methods, such as interviews or focus groups, to *complement* the network-based analysis by providing deeper insight into how firms and stakeholders perceive materiality and the interconnectedness of the SDGs. While our approach maps observable patterns of SDG associations in communication, qualitative inquiry could help unpack the meanings, judgments, and organizational logics that underlie these patterns. Such an approach would also facilitate a more nuanced examination of the interdependencies between stakeholder engagement with the SDGs and the quality of related corporate reporting. Also, future research could examine how mapping SDG interconnections might help organizations identify and navigate potential trade-offs between competing sustainability goals. Additionally, future research could conduct longitudinal studies to examine how stakeholder and firm perceptions of SDGs evolve over time, as well as the impact of regulatory developments within the sustainability reporting landscape on SDG reporting. Next, exploring potential differences between Nestlé's official Twitter communications and its sustainability reports would offer theoretically valuable insights into how organizations strategically tailor their sustainability messaging across diverse communication channels and stakeholder audiences. Such a comparison can contribute to a more nuanced understanding of corporate transparency and accountability, particularly in the digital era, where stakeholders increasingly rely on different sources of information to evaluate corporate behavior. Lastly, future research can also explore how companies may react to stakeholder tweets that are calling for certain issues to be considered material. This analysis will shed light on the usefulness of stakeholder engagement in defining material topics and their disclosures in the sustainability reports.

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Appendices

Appendix 1. Examples of SDG-related information in Nestlé's 2016 sustainability report

SDGs referenced	Report fragments
SDG 2, SDG 3, SDG 6, SDG 12	Rural development - Roll out rural development baseline assessments to understand the needs of farmers; Improve farm economics among the farmers who supply us; Improve food availability and dietary diversity among the farmers who supply us; Implement responsible sourcing in our supply chain and promote animal welfare; Roll out the Nestlé Cocoa Plan with cocoa farmers Continuously improve our green coffee supply chain.
SDG 2, SDG 3, SDG 6, SDG 11, SDG 12, SDG 13, SDG 14, SDG 15	Water - Work to achieve water efficiency and sustainability across our operations; Advocate for effective water policies and stewardship; Treat the water we discharge effectively; Engage with suppliers, especially those in agriculture; Raise awareness on water conservation, and improve access to water and sanitation across our value chain.
SDG 2, SDG 5, SDG 10, SDG 11, SDG 12, SDG 13, SDG 14, SDG 15, SDG 16	Our people, human rights and compliance - Assess and address human rights impacts across our business activities; Improve workers' livelihoods and protect children in our agricultural supply chain; Enhance a culture of integrity across the organization; Ensure that all Nestlé employees are covered by a certified safety and health management system; Enhance gender balance in our workforce and empower women across the entire value chain; Provide effective grievance mechanisms to employees and stakeholders; Roll out the Global Youth Initiative across all our operations; Provide training on Corporate Business Principles, Nutrition and Environmental Sustainability; Advocate for healthy workplaces and healthier employees.

Appendix 2. Examples of tweets related to SDGs

SDG referenced	Tweet text
SDG 1, SDG 2, SDG 3	One minute they're malnourishing babies in Africa (https://t.co/952p82GmDz), now this?! You've gone too far @Nestlé. https://t.co/HrABho4iNp
SDG2	#CSVForum "When you're hungry you can't work & you're really not prepared for development". We need to discuss! @Nestlécsv @mmfng @Nestlé
SDG 2, SDG 3, SDG 12	BOYCOTT @Nestlé ??2017?? 4 BLOCKING GMO LABELING @TheGOPJesus @pgoeltz @BernieManiaa @mizwizmizwiz @BetzMyboyblue11 @PirjoCheerio @SupaReaper https://t.co/USnhOuSNog
SDG4	Education should be a right not a luxury. @NanhiKali @Nestlé #education
SDG5, SDG 12	Here is the report we sent to @MDLZ @Nestlé and @marsglobal on gender equality in #cocoa sector https://t.co/HuWoGzhGYB #women4cocoa
SDG 6, SDG 12, SDG 13, SDG 15	.@JerryBrownGov: 3 million Californians don't have access to clean water. They need water not @Nestlé: http://t.co/8kDVdvLGBI #CADrought
SDG7	Not applicable
SDG8, SDG 12	Hold @Nestlé and @BATpress accountable for horrific factory conditions #TampacoFoilsFire
SDG9	Not applicable
SDG10	Not applicable
SDG11, SDG 12, SDG 15	New @Nestlé & USAID project in South Sudan is focused on #ruraldev for stability, but does it emphasize #biodiv? https://t.co/KfqMYkb44g
SDG 12, SDG13, SDG 15	Palm oil is bad, bad, bad. Deforestation, orangutan destruction, junk filler in food, now this. @KelloggCompany @Unilever @Nestlé https://t.co/J2osL0GReT
SDG13	The politics of #climate change shouldn't change industry's commitment to reducing carbon intensity https://t.co/igQ7d92f30 @Nestlé #COP21
SDG12, SDG 13, SDG14	Our oceans are choking on plastic waste. Stop @Nestlé and #UnbottleWater
SDG12, SDG 13, SDG15	Nice try @Nestlé commercial. We all know you don't care about endangered animals
SDG 2, SDG 3, SDG 6, SDG 8, SDG 12, SDG16	Shame on @Nestlé for so many reasons! We have a #righttoknow what is in our f#ood and a right to #water! #childslavery #humanrights #Greed
SDG17	Prof John O'Brien,@Nestlé - changing reality framing food safety includes big data,#foodethics,#climatechange https://t.co/N11wdTO8mW

Figure 1. Nestlé materiality matrix 2016.

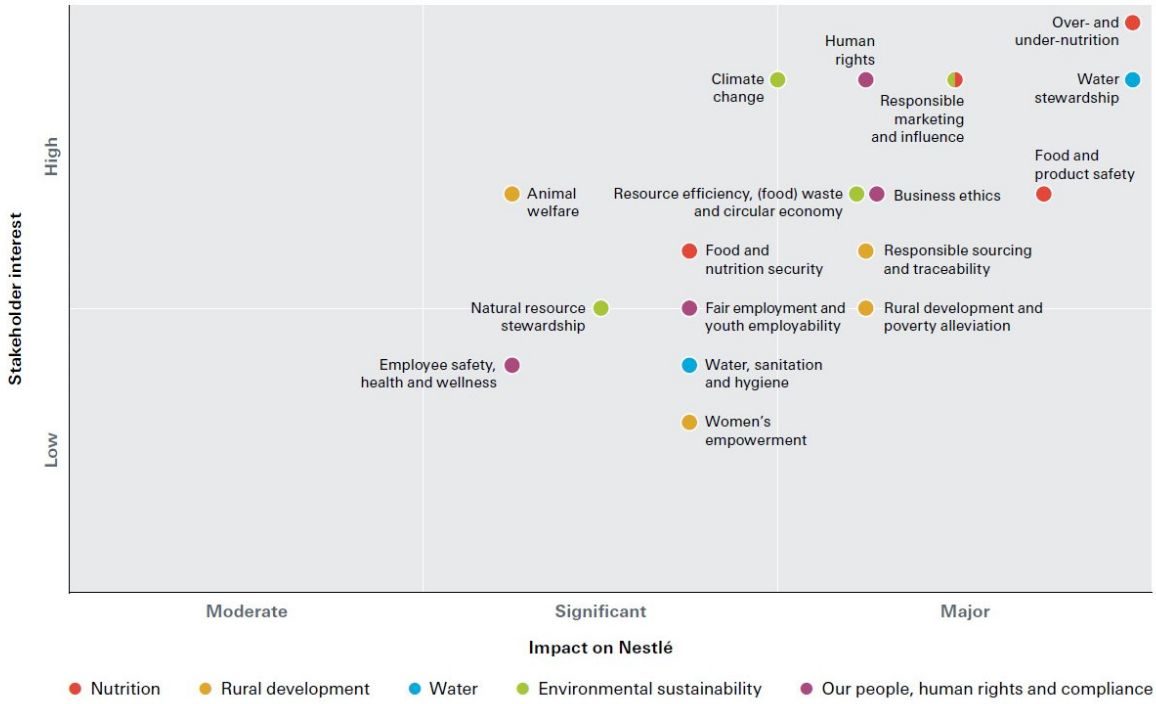


Figure 2. Materiality matrix constructed using stakeholder SDG communications on Twitter and the extent of SDG-related information disclosed in Nestlé sustainability report in 2016.

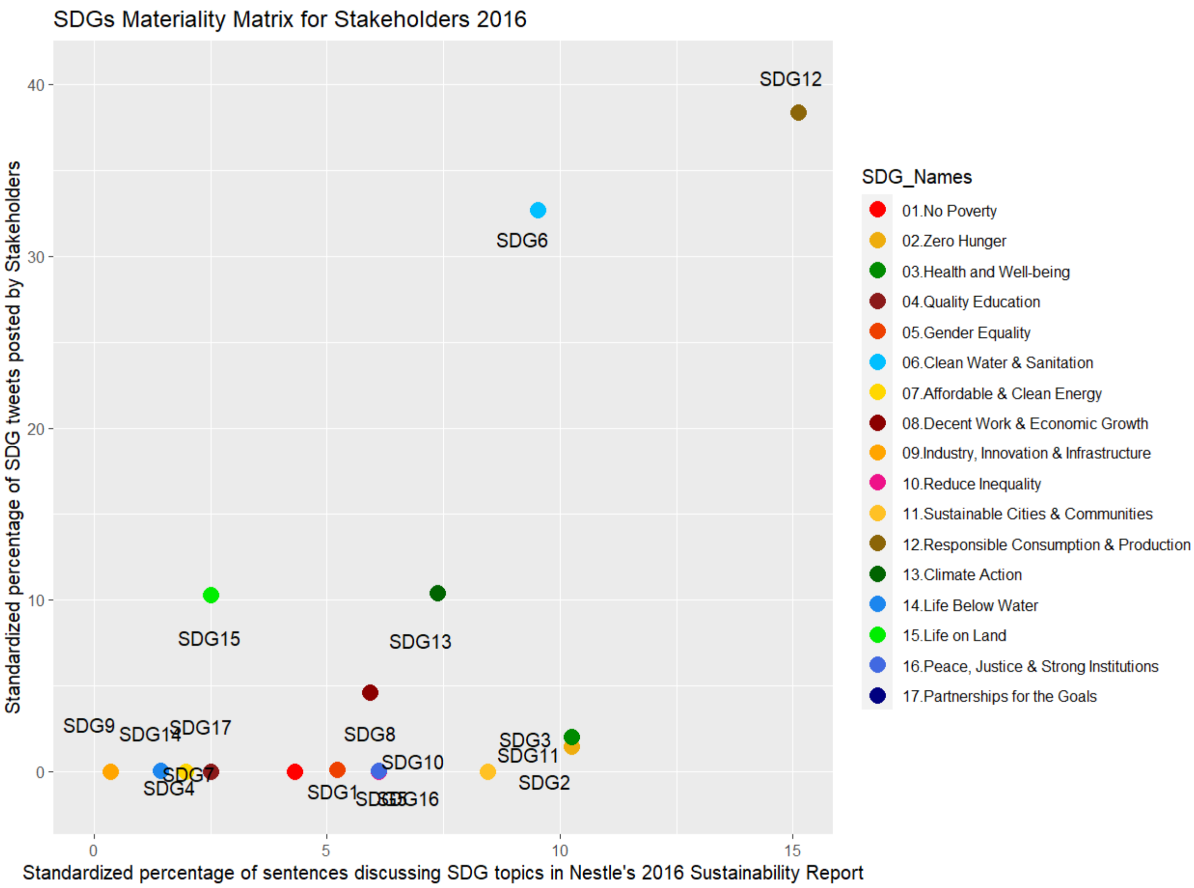
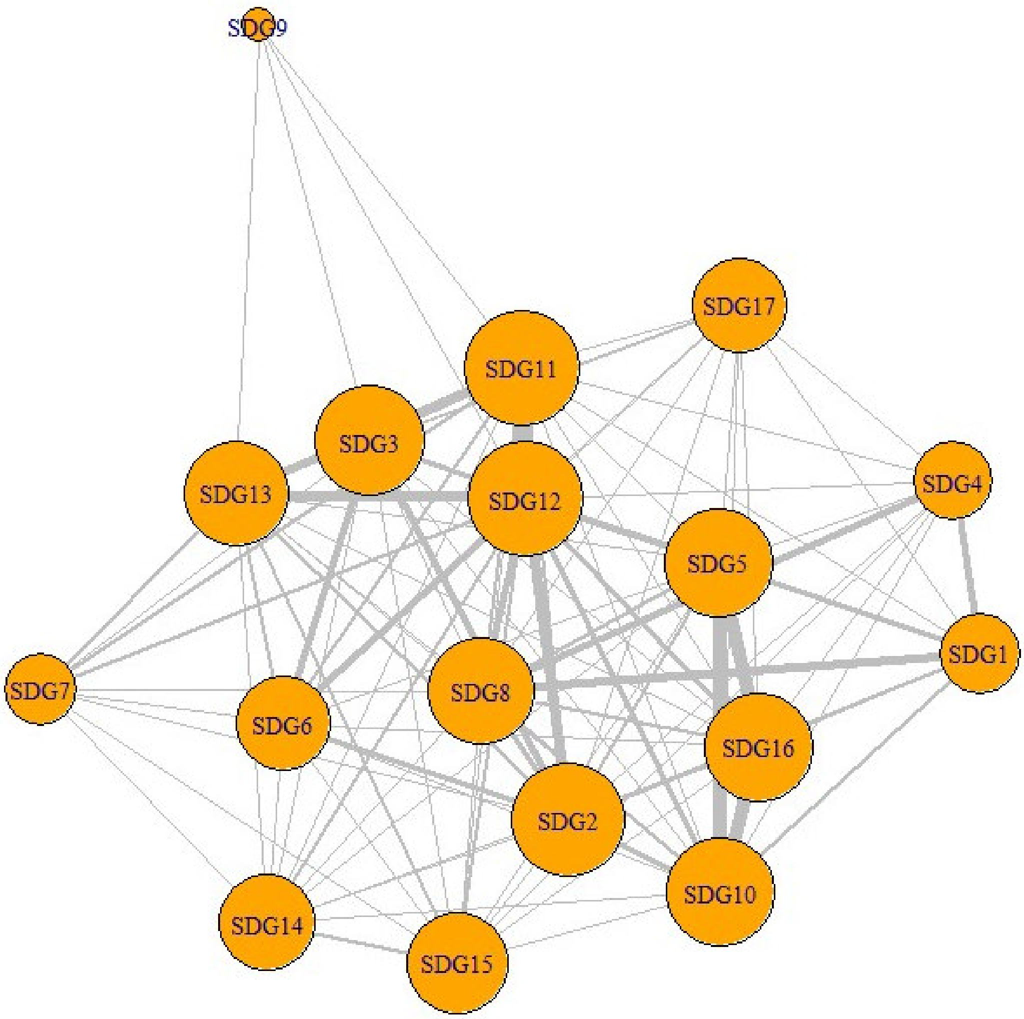
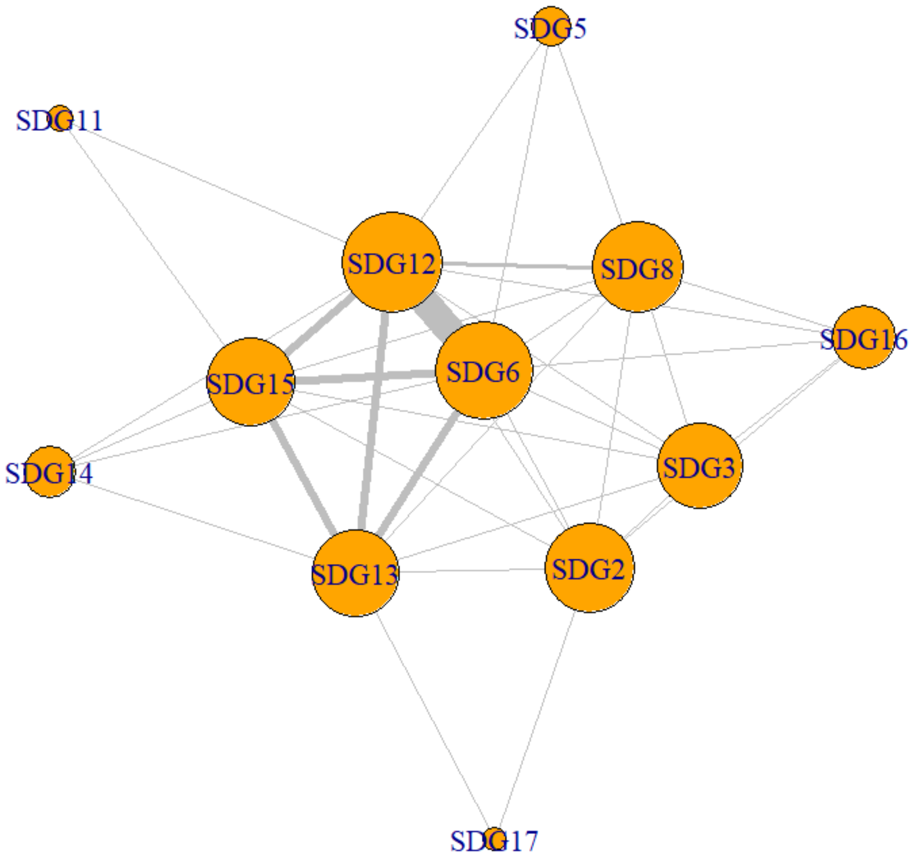


Figure 3. Social network analysis of the interconnectedness of SDGs communicated by Nestlé's in its 2016 sustainability report.



SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

Figure 4. Social network analysis of the interconnectedness of SDGs communicated by stakeholders on Twitter in 2016.



SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

Table 1. Materiality matrix of SDGs communicated by Nestlé and stakeholders

SDGs	Nestlé		Stakeholders	
	#Sentences	Standardized %	#Tweets	Standardized %
SDG 1 *No Poverty*	24	4.317	0	0
SDG 2 *Zero Hunger*	57	10.252	723	1.466
SDG 3 *Health and Well-being*	57	10.252	991	2.009
SDG 4 Quality Education	14	2.518	3	0.006
SDG 5 *Gender Equality*	29	5.216	56	0.114
SDG 6 *Clean Water and Sanitation*	53	9.532	16129	32.697
SDG 7 *Affordable and Clean Energy*	11	1.978	0	0
SDG 8 *Decent Work and Economic Growth*	33	5.935	2278	4.618
SDG 9 *Industry, Innovation and Infrastructure*	2	0.360	0	0
SDG 10 *Reduce Inequality*	34	6.115	0	0
SDG 11 *Sustainable Cities and Communities*	47	8.453	1	0.002
SDG 12 *Responsible Consumption and Production*	84	15.108	18919	38.353
SDG 13 *Climate Action*	41	7.374	5128	10.396
SDG 14 *Life Below Water*	8	1.439	13	0.026
SDG 15 *Life on Land*	14	2.518	5073	10.284
SDG 16 *Peace, Justice and Strong Institutions*	34	6.115	14	0.028
SDG 17 *Partnerships for the Goals*	14	2.518	1	0.002

Note: Table 1 presents the materiality matrix of SDGs communicated by Nestlé and stakeholders. Column 2 and 3 presents the number of sentences and its standardized percentage mentioning each SDG as identified by SDG dictionary in Nestlé's 2016 sustainability report. Column 4 and 5 presents the number of tweets and its standardized percentage mentioning each SDG communicated by stakeholders on Twitter.

Table 2. Centrality of SDGs communicated by Nestlé in 2016 sustainability report

SDGs	Degree	Betweenness	Closeness	Eigenvector
SDG1	10.00	0.10	0.05	0.69
SDG2	15.00	2.08	0.06	0.98
SDG3	15.00	4.26	0.06	0.95
SDG4	10.00	0.20	0.05	0.69
SDG5	14.00	1.21	0.06	0.94
SDG6	12.00	0.67	0.05	0.82
SDG7	9.00	0.08	0.04	0.63
SDG8	14.00	1.75	0.06	0.92
SDG9	4.00	0.00	0.04	0.29
SDG10	14.00	1.21	0.06	0.94
SDG11	16.00	5.42	0.06	1.00
SDG12	16.00	5.42	0.06	1.00
SDG13	14.00	3.25	0.06	0.90
SDG14	12.00	0.42	0.05	0.82
SDG15	13.00	1.08	0.05	0.87
SDG16	14.00	1.21	0.06	0.94
SDG17	12.00	0.66	0.05	0.82

Note: Table 2 presents different centrality measures of SDGs disclosed by Nestlé in 2016 sustainability report. *Degree* measures the number of direct ties a node has with other nodes in the network. *Betweenness* measures how often a node resides on the shortest path between any other two nodes of the network. *Closeness* indicates how closely a node interconnected to many other nodes in the network. *Eigenvector* represents the power and prestige of a node in the network.

SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

Table 3. Centrality of SDGs communicated by stakeholders on Twitter

SDGs	Degree	Betweenness	Closeness	Eigenvector
SDG1	-	-	-	-
SDG2	8.00	4.90	0.07	0.92
SDG3	7.00	0.40	0.07	0.86
SDG4	-	-	-	-
SDG5	3.00	0.00	0.05	0.40
SDG6	9.00	4.15	0.08	0.97
SDG7	-	-	-	-
SDG8	8.00	2.40	0.07	0.90
SDG9	-	-	-	-
SDG10	-	-	-	-
SDG11	2.00	0.00	0.05	0.26
SDG12	10.00	9.65	0.08	1.00
SDG13	8.00	5.25	0.07	0.87
SDG14	4.00	0.00	0.06	0.52
SDG15	8.00	4.25	0.07	0.87
SDG16	5.00	0.00	0.06	0.64
SDG17	2.00	0.00	0.05	0.24

Note: Table 3 presents different centrality measures of SDGs communicated by stakeholders on Twitter. *Degree* measures the number of direct ties a node has with other nodes in the network. *Betweenness* measures how often a node resides on the shortest path between any other two nodes of the network. *Closeness* indicates how closely a node interconnected to many other nodes in the network. *Eigenvector* represents the power and prestige of a node in the network. Missing values are presented using "-".

SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

Table 4. Intensity of interconnectedness among SDGs communicated by stakeholders and Nestlé

SDG interconnectedness	Nestlé	Stakeholders	SDG interconnectedness	Nestlé	Stakeholders
SDG1---SDG8	36	-	SDG5---SDG14	2	-
SDG1---SDG4	27	-	SDG6---SDG8	-	15
SDG1---SDG12	20	-	SDG6---SDG12	30	15734
SDG1---SDG10	17	-	SDG6---SDG11	16	-
SDG1---SDG2	17	-	SDG6---SDG13	14	4660
SDG1---SDG5	11	-	SDG6---SDG15	11	4630
SDG1---SDG16	6	-	SDG6---SDG10	7	-
SDG1---SDG3	6	-	SDG6---SDG16	7	1
SDG1---SDG17	4	-	SDG6---SDG17	7	-
SDG1---SDG11	3	-	SDG6---SDG14	2	1
SDG2---SDG12	44	429	SDG6---SDG7	1	-
SDG2---SDG3	29	650	SDG7---SDG12	18	-
SDG2---SDG6	25	166	SDG7---SDG13	18	-
SDG2---SDG10	22	-	SDG7---SDG11	15	-
SDG2---SDG8	22	9	SDG7---SDG14	6	-
SDG2---SDG13	19	14	SDG7---SDG8	5	-
SDG2---SDG11	15	-	SDG7---SDG15	3	-
SDG2---SDG5	15	-	SDG8---SDG12	29	2276
SDG2---SDG16	13	1	SDG8---SDG10	15	-
SDG2---SDG15	10	7	SDG8---SDG11	14	-
SDG2---SDG4	6	-	SDG8---SDG16	14	14
SDG2---SDG14	5	-	SDG8---SDG15	7	90
SDG2---SDG17	4	1	SDG8---SDG14	6	-
SDG2---SDG7	2	-	SDG8---SDG13	5	93
SDG3---SDG6	29	394	SDG8---SDG17	5	-
SDG3---SDG12	23	418	SDG9---SDG11	3	-
SDG3---SDG11	19	-	SDG9---SDG12	3	-
SDG3---SDG10	13	-	SDG9---SDG13	2	-
SDG3---SDG16	7	1	SDG10---SDG16	55	-
SDG3---SDG13	6	11	SDG10---SDG12	26	-
SDG3---SDG17	6	-	SDG10---SDG11	9	-
SDG3---SDG5	6	-	SDG10---SDG13	9	-
SDG3---SDG8	5	10	SDG10---SDG15	3	-
SDG3---SDG9	5	-	SDG10---SDG14	2	-
SDG3---SDG7	3	-	SDG10---SDG17	2	-
SDG3---SDG14	1	-	SDG11---SDG12	77	1
SDG3---SDG15	1	8	SDG11---SDG13	36	-
SDG4---SDG8	27	-	SDG11---SDG15	13	1
SDG4---SDG12	11	-	SDG11---SDG14	12	-
SDG4---SDG5	8	-	SDG11---SDG16	12	-
SDG4---SDG10	5	-	SDG11---SDG17	8	-
SDG4---SDG17	4	-	SDG12---SDG13	44	5109
SDG4---SDG11	3	-	SDG12---SDG16	24	14
SDG4---SDG16	3	-	SDG12---SDG15	18	5073
SDG4---SDG15	2	-	SDG12---SDG14	15	10
SDG5---SDG10	56	-	SDG12---SDG17	9	-
SDG5---SDG16	55	-	SDG13---SDG15	18	5020
SDG5---SDG12	27	21	SDG13---SDG16	9	-
SDG5---SDG8	18	7	SDG13---SDG14	6	12
SDG5---SDG11	9	-	SDG13---SDG17	4	1
SDG5---SDG13	9	-	SDG14---SDG15	14	1
SDG5---SDG6	9	14	SDG14---SDG16	2	-
SDG5---SDG15	5	-	SDG15---SDG16	5	-
SDG5---SDG17	5	-	SDG16---SDG17	2	-

Note: Table 4 presents the intensity of interconnectedness among SDGs communicated by Nestlé and stakeholders. The dotted lines between SDGs indicate their interconnectedness. Column 2 presents the interconnectedness among SDGs communicated by Nestlé. Column 3 presents the interconnectedness among SDGs communicated by stakeholders.

SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

Materiality assessment and interconnectedness of Sustainable Development Goals: Uncovering misalignments between corporate and stakeholder priorities

Supplementary materials

S1. Additional analysis - SDG materiality by different stakeholder groups

To identify and categorize four stakeholder groups (stakeowners, stakewatchers, stakekeepers, and stakeseekers), we manually analyze the username, description (bio) and personal website (variable name "URL", next to location in the dataset) of these 28,714 tweets and code each tweet's author into these four groups (Saxton *et al.*, 2020). The stakeholder groups are not mutually exclusive; for example, journalists are classified as stakekeepers (see Fassin, 2012), but when they provide information about purchasing the company's products, they are also categorized as stakeowners. The intercoder reliability related to this coding was also tested, and any differences in coding between the coders were resolved by the research team. Some examples of this coding are illustrated in Table S2.

Table S2. Examples of how stakeholders were classified

Stakeholder group coding	Tweet text
Stakeowners	LeapIntoFashionSD, San Diego, CA: I just signed a petition @CourageCampaign telling @forestservice 2 stop @Nestlé from bottling our water! https://t.co/vMDy7jmC4Y #CADrought
Stakewatchers	Amnesty Ireland: .@colgate .@Nestlé .@unilever contributing to child labour & wretched conditions for workers on palm oil plantations https://t.co/kpE3faQjZ9 https://t.co/pGXvHFJS5c
Stakekeepers	Shane Woodford, Freelance journalist in the EU: Pot protesters now talking about @Nestlé "stealing our water" things seem to be calmed down now
Stakeseekers	Private user 1, London: .@Nestlé is finally getting sued over child slavery in its supply chain.

Figure S1 presents the materiality matrix constructed using different stakeholder groups' SDG communications on Twitter/X and the extent of SDG-related information disclosed in Nestlé's 2016 sustainability report. Consistent with our main finding, all four stakeholder groups consider SDG 6 *Clean Water and Sanitation* and SDG 12 *Responsible Consumption and Production* material. However, stakewatchers additionally consider SDG 2 *Zero Hunger* and SDG 3 *Good Health and Well-being* material topics. This is probably because stakewatchers represent some stakeowners who cannot express their voices on social media. For example, SDG 2 *Zero Hunger* is more applicable to people who are living under poverty, and SDG 3 *Good Health and Well-being* are more relevant to people who suffer from poor health and lack access to quality health care. Consequently, these people are less able to express their concerns via social media; hence, they rely on stakewatchers to act on their behalf. Stakeowners and stakeseekers, on the other hand, share similar views on SDG materiality.

Figure S1. Materiality matrix constructed using different stakeholder groups' SDG communications on X and the extent of SDG-related information actually disclosed in Nestlé sustainability report.

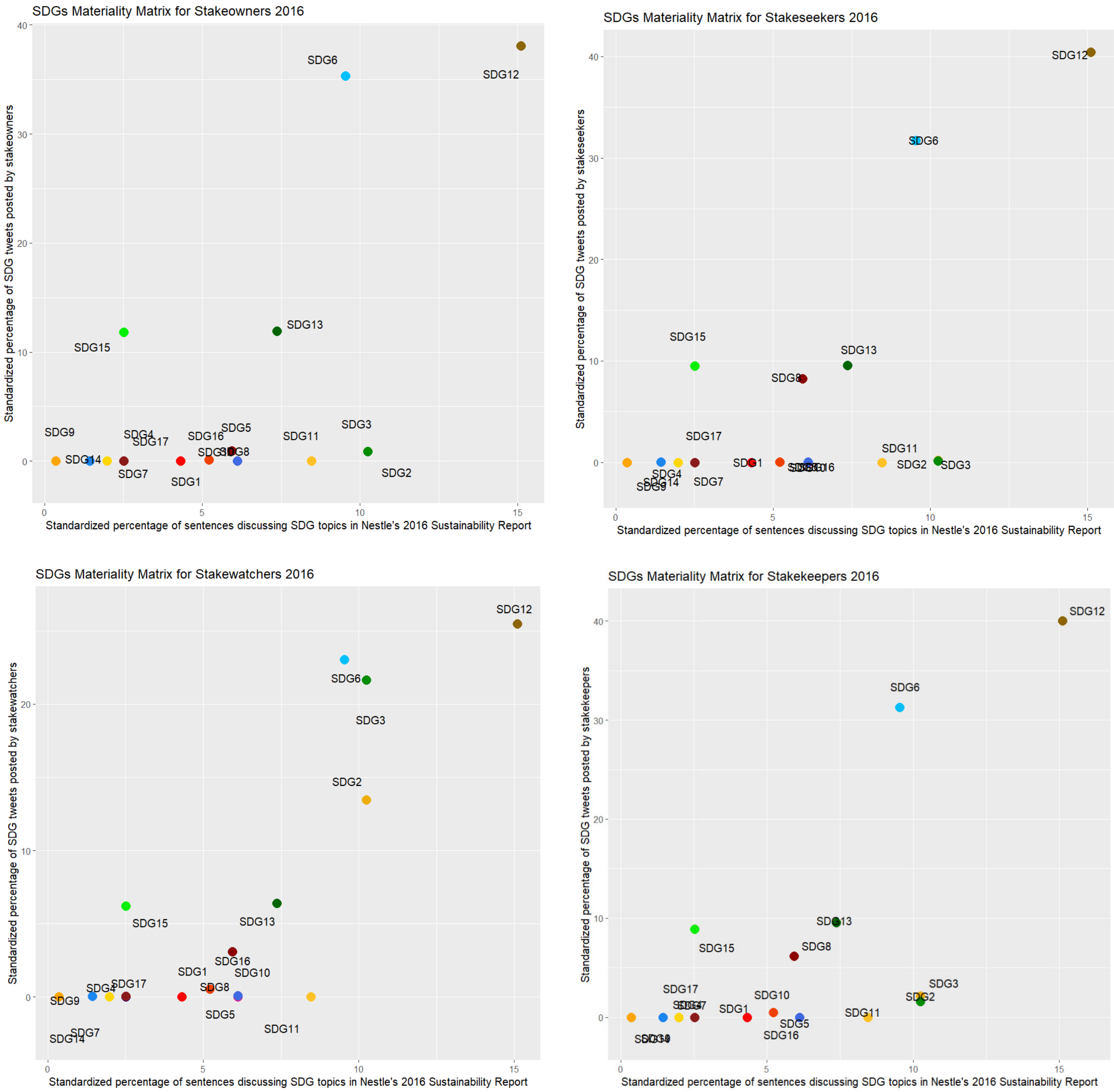
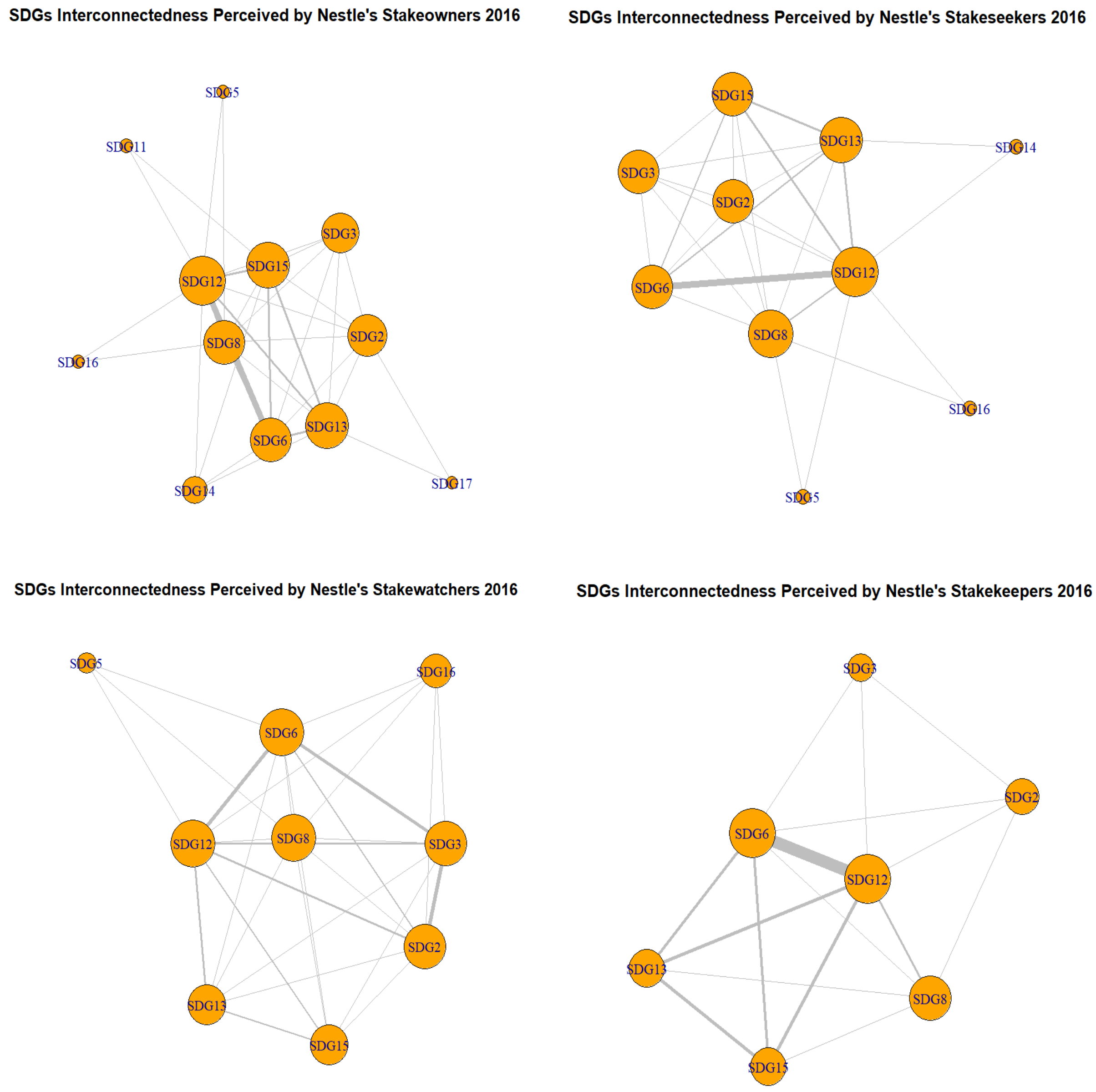


Figure S2 maps the interconnectedness of the SDGs communicated by the different stakeholder groups on Twitter/X. Regarding stakeowners, SDG 12 *Responsible Consumption and Production* and SDG 13 *Climate Action* are more central to the network, while SDG 1 *No poverty*, SDG 5 *Gender Equality*, SDG 11 *Sustainable Cities and Communities*, SDG 14 *Life Below Water*, and SDG 17 *Partnerships for the Goals* are more peripheral. The width of their edges indicates that SDG 6 *Clean Water and Sanitation* and SDG 12 *Responsible Consumption and Production* are strongly connected, indicating that stakeowners consider clean water and sanitation material and that Nestlé should achieve this goal by changing its consumption and production model. In terms of stakekeepers, SDG 6 *Clean Water and Sanitation* and SDG 12 *Responsible Consumption and Production* are more central to the network, and there is strong interconnectedness among SDG 6 *Clean Water and Sanitation*, SDG 12 *Responsible Consumption and Production*, SDG 13 *Climate Action*, and SDG 15 *Life on Land*. This relationship indicates that stakekeepers believe that Nestlé's consumption and production model can have significant impacts on the environmental SDGs. Again, regarding stakewatchers, SDG 6 *Clean Water and Sanitation*, SDG 8 *Decent work and Economic Growth*, and SDG 12 *Responsible Consumption and Production* are more central in the network. The ticker width of the edges among SDG 2 *Zero Hunger*, SDG 3 *Health and Well-being*, SDG 6 *Clean Water and Sanitation*, and SDG 12 *Responsible Consumption and Production* suggests that stakewatchers pay more attention to socially related SDGs. That is, they believe that Nestlé's consumption and production model should play a prominent role in addressing poverty and promoting well-being. Last, in terms of stakeseekers, SDG 8 *Decent work and Economic Growth*, SDG 12 *Responsible Consumption and Production*, and SDG 13 *Climate Action* are more central to the network, and the intensity of interconnectedness indicates that SDG 6 *Clean Water and Sanitation* and SDG 12 *Responsible Consumption and Production* are closely related, similar to the views of stakeowners.

Figure S2. Social network analysis of the interconnectedness of SDGs communicated by different stakeholder groups on Twitter.



SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

In addition to the graphical representation, we present centrality measures and the intensities of interconnectedness of different stakeholder groups in Tables S3 and S4. Consistent with the graphical representation, SDG 12 *Responsible Consumption and Production* is central to the network across different stakeholder groups. However, some SDGs (e.g., SDG 4 *Quality Education*, SDG 7 *Affordable and Clean Energy*, SDG 9 *Industry, Innovation and Infrastructure*, and SDG 10 *Reduce Inequality*) are rarely mentioned by these stakeholders, and some (e.g., SDG 11 *Sustainable Cities and Communities*, SDG 16 *Peace, Justice and Strong*

Institutions, and SDG 17 *Partnerships for the Goals*) are only discussed by certain stakeholder groups. Indeed, considering that Nestlé is a food manufacturing company, the SDGs that are not related to its core business model (e.g., education, affordable energy, and reducing inequality) are probably less likely to be discussed by its stakeholders.

Overall, our additional analysis therefore demonstrates significant heterogeneity among the different stakeholder groups regarding SDG materiality.

Table S3. Centrality of SDGs communicated by different stakeholder groups on Twitter

	Stakeowners				Stakekeepers				Stakewatchers				Stakeseekers			
SDGs	**D**	**B**	**C**	**E**	**D**	**B**	**C**	**E**	**D**	**B**	**C**	**E**	**D**	**B**	**C**	**E**
SDG1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SDG2	7.00	4.00	0.07	0.85	4.00	0.33	0.13	0.73	7.00	0.40	0.11	0.94	6.00	0.00	0.08	0.87
SDG3	6.00	0.00	0.06	0.81	3.00	0.00	0.11	0.57	7.00	0.40	0.11	0.94	6.00	0.00	0.08	0.87
SDG4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SDG5	2.00	0.00	0.05	0.28	-	-	-	-	3.00	0.00	0.08	0.44	2.00	0.00	0.06	0.31
SDG6	7.00	0.75	0.07	0.89	6.00	2.00	0.17	1.00	8.00	2.07	0.13	1.00	6.00	0.00	0.08	0.87
SDG7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SDG8	8.00	6.50	0.07	0.89	5.00	0.67	0.14	0.90	8.00	2.07	0.13	1.00	8.00	5.50	0.10	0.96
SDG9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SDG10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SDG11	2.00	0.00	0.05	0.29	-	-	-	-	-	-	-	-	-	-	-	-
SDG12	10.00	14.75	0.08	1.00	6.00	2.00	0.17	1.00	8.00	2.07	0.13	1.00	9.00	10.00	0.11	1.00
SDG13	8.00	5.75	0.07	0.92	4.00	0.00	0.13	0.78	6.00	0.00	0.10	0.85	7.00	2.50	0.09	0.91
SDG14	4.00	0.00	0.06	0.56	-	-	-	-	-	-	-	-	2.00	0.00	0.06	0.30
SDG15	8.00	4.25	0.07	0.93	4.00	0.00	0.13	0.78	6.00	0.00	0.10	0.85	6.00	0.00	0.08	0.87
SDG16	2.00	0.00	0.04	0.26	-	-	-	-	5.00	0.00	0.09	0.72	2.00	0.00	0.06	0.31
SDG17	2.00	0.00	0.05	0.28	-	-	-	-	-	-	-	-	-	-	-	-

Note: Table S3 presents different centrality measures of SDGs communicated by different stakeholder groups on Twitter. *Degree* (D) measures the number of direct ties a node has with other nodes in the network. *Betweenness* (B) measures how often a node resides on the shortest path between any other two nodes of the network. *Closeness* (C) indicates how closely a node interconnected to many other nodes in the network. *Eigenvector* (E) represents the power and prestige of a node in the network. Missing values are presented using "-".

SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*

Table S4. Intensity of interconnectedness among SDGs communicated by different stakeholder groups.

SDG interconnectedness	Stakeowners	Stakekeepers	Stakewatchers	Stakeseekers
SDG1---SDG2	-	-	-	-
SDG1---SDG3	-	-	-	-
SDG2---SDG3	155	9	454	32
SDG2---SDG6	9	1	148	8
SDG2---SDG8	3	1	3	2
SDG2---SDG12	131	8	260	30
SDG2---SDG13	8	-	3	3
SDG2---SDG15	4	-	2	1
SDG2---SDG16	-	-	1	-
SDG2---SDG17	1	-	-	-
SDG3---SDG6	13	1	375	5
SDG3---SDG8	5	-	4	1
SDG3---SDG12	132	6	254	26
SDG3---SDG13	6	-	2	3
SDG3---SDG15	5	-	2	1
SDG3---SDG16	-	-	1	-
SDG5---SDG6	-	-	14	-
SDG5---SDG8	3	-	2	2
SDG5---SDG12	3	-	17	1
SDG6---SDG8	10	1	1	3
SDG6---SDG12	7656	277	448	7539
SDG6---SDG13	2310	69	129	2154
SDG6---SDG14	1	-	-	-
SDG6---SDG15	2292	68	125	2147
SDG6---SDG16	-	-	1	-
SDG8---SDG12	200	55	107	1915
SDG8---SDG13	76	5	5	7
SDG8---SDG15	75	4	5	6
SDG8---SDG16	1	-	3	10
SDG11---SDG12	1	-	-	-
SDG11---SDG15	1	-	-	-
SDG12---SDG13	2588	85	222	2216
SDG12---SDG14	7	-	-	3
SDG12---SDG15	2572	79	216	2208
SDG12---SDG16	1	-	3	10
SDG13---SDG14	9	-	-	3
SDG13---SDG15	2533	76	213	2200
SDG13---SDG16	-	-	-	-
SDG13---SDG17	1	-	-	-
SDG14---SDG15	1	-	-	-

Note: Table S4 presents the intensity of interconnectedness among SDGs communicated by different stakeholder groups. The dotted lines ("---") between SDGs indicate their interconnectedness. Column 2 presents the interconnectedness among SDGs communicated by Nestlé. Column 3 presents the interconnectedness among SDGs communicated by stakeholders. Missing values are presented using "-".

SDG names: SDG 1 *No poverty,* SDG 2 *Zero Hunger,* SDG 3 *Health and Well-being,* SDG 4 *Quality Education,* SDG 5 *Gender Equality,* SDG 6 *Clean Water and Sanitation,* SDG 7 *Affordable and Clean Energy,* SDG 8 *Decent work and Economic Growth,* SDG 9 *Industry, Innovation and Infrastructure,* SDG 10 *Reduce Inequality,* SDG 11 *Sustainable Cities and Communities,* SDG 12 *Responsible Consumption and Production,* SDG 13 *Climate Action,* SDG 14 *Life Below Water,* SDG 15 *Life on Land,* SDG 16 *Peace, Justice and Strong Institutions,* SDG 17 *Partnerships for the Goals.*