
Miscellaneous

Álvaro Luna García

<https://orcid.org/0000-0002-1372-1275>

alvaro.luna@urjc.es

Universidad Rey Juan Carlos

Miguel Ángel Martín-Cárdaba

<https://orcid.org/0000-0003-3897-2537>

mmartincar@villanueva.edu

Universidad Villanueva

Rafael Carrasco Polaino

<https://orcid.org/0000-0002-0687-6842>

racarras@ucm.es

Universidad Complutense de Madrid

Ernesto Villar-Cirujano

<https://orcid.org/0000-0001-6263-5093>

evillar@villanueva.edu

Universidad Villanueva

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Sustainability and Fashion Brand Communication on Instagram: An analysis beyond engagement

Abstract

The purpose of this research is to understand how the most sustainable fashion brands, according to five corporate sustainability rankings, use Instagram to disseminate messages related to the field of sustainability, as well as how such communications are received by their followers, not only in terms of engagement but also by analyzing the favourability sentiment of their comments. The research was conducted through a quantitative content analysis, using automated semantic analysis tools of Instagram posts by sustainable fashion brands. This analysis generated a dataset with 277,955 published posts, which was filtered, only including publications that contained specific words related to sustainability, resulting in the final analysis of 12,639 publications. This study contributes to understanding how sustainable fashion brands effectively communicate sustainability-related topics and news on social networks like Instagram, which helps spark interest and generate a positive dialogue with their audience. Findings indicate that this type of content can be useful for generating a positive conversation with their social media followers, as well as the importance of analyzing the sentiment of such interactions when considering the communicative effectiveness of posts. The use of automated semantic analysis tools allowed for a more representative sample of sustainable fashion brands to be covered, providing data-based evidence of the different factors that can influence engagement and favourability of sustainable communication in fashion.

Keywords

Sustainability, brand reputation, rankings, Instagram, fashion industry, social networks.

1. Introduction

Since the approval of the 2030 Agenda and the Sustainable Development Goals in 2015, communicating sustainability has become an important challenge for companies and brands in the textile industry and the fashion sector (Pérez-Bou & Cantista, 2023; San Miguel et al., 2021). Sustainability has emerged as an essential part of the business culture of small, medium, and large companies, influencing their values, their leadership, and the corporate social responsibility strategies that guide their behaviour in the market (Reilly & Larya, 2018). 96% of fashion brands consider this aspect as a brand attribute with a high impact on the current and future development of the company (Ernst & Young & Modaes, 2021).

The most reputable and transparent brands in terms of sustainability attract shareholders and new investors (Sroufe & Gopalakrishna-Remani, 2019), especially in the textile industry, even though it is considered one of the most polluting industries (García-Torres et al., 2017; EEA & ETC, 2023). This interest in knowing whether a company is sustainable or not is demonstrated by the development and publication of numerous rankings in which the most sustainable companies worldwide are listed each year (Barnett & Leih, 2018; Díez-Cañamero et al., 2020).

An important part of this transition towards sustainability has focused on the analysis of the strategies implemented by fashion brands when communicating sustainability in social networks (Lee & Weder, 2021; Lee & Lin, 2022). Social networks are agile and direct communication tools that prove key for brands (Rust et al., 2021), especially in the fashion sector where they make significant efforts to communicate their commitment to sustainability on networks such as Twitter (Reilly & Larya, 2018) and Instagram, among others (Testa et al., 2021). Of all social networks, Instagram, thanks to its eminently visual nature and its employability as a promotional and sales channel, is likely the most relevant to the fashion industry (Castillo-Abdul et al., 2022).

According to the Digital 2022 report, developed jointly by We Are Social & Hootsuite (2022), 57% of the global population is an active user of social networks and 43% of this population uses them to search for information about brands. Likewise, in 2021, 81.5% resorted to this medium to search for a product or service and 77% did so through a technological device (We Are Social & Hootsuite, 2022). Therefore, the ability to effectively communicate sustainability on social networks is a defining opportunity for brands, since otherwise, their reputation would be compromised among their main stakeholders (Sroufe & Gopalakrishna-Remani, 2019) by negatively affecting the attitudes and behaviours of users of these social networks as well as their sales and brand value (Dunn & Harness, 2018).

Although some earlier research (e.g., Kwon & Lee, 2021; Milanese et al., 2022; Testa et al., 2021; Yuen, Zeng & Lo 2021; Zhao et al., 2021) have attempted to study how fashion brands can best employ social networks to communicate their sustainability efforts and generate greater interactivity and engagement with their users, to date no investigation has yet examined relevant aspects such as the favourability of such interactions (i.e., the degree of agreement or disagreement) and, particularly, the comments.

Thus, the objective of this research is to analyze the communication that the most sustainable fashion brands carry out through Instagram, as well as the reactions and responses of their followers by examining not only the engagement and interaction they elicit but also the degree of favourability and acceptance of such responses while trying, consequently, to identify the best communication practices in terms of sustainability.

2. Literature review

2.1. Sustainability and the fashion industry: brand value and reputation

The *Fashion Industry Charter for Climate Action*, launched in 2018 by the United Nations during the COP24 Climate Summit held in Poland (UNFCCC, 2021), as well as the approval of the *Fashion Pact* driven in 2020 and signed by more than 200 fashion brands from 17 countries (Fashion Pact, 2020), have been important milestones for the establishment of a common agenda in the commitment to sustainability and climate change. Both declarations recognize the importance of transparent and responsible communication by the fashion industry on sustainability to its key stakeholders. However, there is still a lack of consensus on the definition of sustainable fashion, as well as low consumer awareness and weak demand for sustainable fashion products, which impede effective communication and strategic approaches to tackle its environmental, social, and economic impacts on brands and their parent companies (Hur & Cassidy, 2019). For example, interconnected supply chains complicate the adoption of sustainable materials and practices within the fashion industry. Furthermore, global economic and competitive pressures prioritize profitability over long-term sustainability goals in sustainable fashion (Joy & Peña, 2017). These challenges arise at two main levels. On the one hand, at the individual level, impulsive buying and the constant desire for novelty make these measures difficult to implement. On the other hand, at cultural level, marketing and fast fashion promote unsustainable consumption patterns, further complicating effective efforts by many brands to achieve sustainability (Hur & Cassidy, 2019).

In addition, the impact of sustainability and environmental awareness in the fashion industry has had a considerable influence on corporate social responsibility reports (Velasco-Molpierrez et al., 2022) and brand reputation strategies in addressing responsible consumption which has attracted the attention of both consumers and investors (San Miguel et al., 2021).

In this setting, sustainability and brand reputation rankings have become powerful indicators of their value in the market and of their true commitment to sustainability (Barnett & Leih, 2018). These rankings have emerged as an important indicator that accounts for the economic value of brands as well as the intangible factors that influence their reputation (Alcaide González et al., 2020). Specifically, there are five rankings particularly relevant to sustainability. In particular, the MSCI Environmental Social Governance (ESG) rating is one of the most important global sustainability and responsible investment index that categorizes companies according to their environmental impact by assigning them a rating ranging from AAA and AA for the leading companies to B and CCC for the lowest ranked. Corporate Knights Global 100 is an annual ranking of the 100 most sustainable companies globally. The Good On You ranking is focused on the fashion industry and classifies the most sustainable and ethical brands in this sector. Fashion Transparency Index reviews the 250 largest fashion brands and retailers according to their level of public disclosure and impact on human rights, environmental practices, and policies. Finally, S&P Global ESG ranking publishes a yearbook of the top-ranked sustainable companies.

Hence, the relationship between sustainability and brand reputation as well as the connection between its value and its reputation in the market contribute positively to the development of corporate sustainability strategies (Alcaide et al., 2020). These strategies help brands differentiate themselves from their competitors enhancing their image and attracting investors (Grubor & Milovanov, 2017). Thus, a good corporate sustainability strategy contributes to the improvement of the brand's reputation and value not only in the eyes of consumers but also in relation to its stakeholders (Peloza et al., 2012).

According to the *Pulse of the Fashion Industry* report published by Boston Consulting Group in 2019, social and environmental responsibility in the fashion industry plays a key role in consumer perceptions and attitudes towards brand image and reputation. As a result, sustainable fashion has become increasingly relevant in the communication and traceability

strategies of the textile industry, as well as in the emergence of new sustainable fashion brands with social networks being an important space for interaction with users and consumers (Lee & Weder, 2021).

2.2. Social media communication and fashion sustainability

The historical evolution of the fashion industry's interest in sustainability has been influenced by the rise of social media as a transformative tool and a driver for social change (Vladimirova et al., 2024; Hilbert, 2020). Social media platforms such as Instagram have evolved into critical spaces for sharing sustainability narratives and practices by influencers, brands and activists, especially by "digital natives" who are particularly sensitive to sustainable issues (Haines et al., 2023). Moreover, consumers are becoming increasingly aware of the social and environmental impact of their purchasing decisions, pushing slow and fast fashion brands to improve their sustainable practices. Consequently, brands have progressively embraced these sustainable practices as marketing strategy tools highlighting transparency, ethical practices, and eco-friendly product lines (Bonilla-Quijada et al., 2024). However, although sustainability seems to have a growing presence in the social media communication of fashion brands on platforms like Instagram (e.g., Marcella-Hood, 2023), to date, no research has attempted to quantify what percentage of their communication is dedicated to sustainability-related topics.

Nevertheless, the persuasive power and extent of social networks have made them one of the main channels of communication between brands and their followers/consumers (Vernuccio, 2014). Their interactive and conversational nature has given the user unprecedented control over messages. This control over the message allows network users to manifest their reactions, attitudes, and perceptions about the brands of which they are followers or detractors (Dunn & Harness, 2018). This relationship has increased competitiveness among fashion brands seeking their space on the network, giving rise to user-generated branding strategies (user-generated branding), where brands' business communication strategies are co-defined and co-created from the relationships with their consumers (Heil et al., 2010).

These relationships have changed how consumers interact, thus weakening the dominance that brands have had over their messages (Kaplan & Haenlein, 2010). However, communicating responsibly and transparently about sustainability increases their engagement with consumers, enhances their reputation, and increases sales (Kim & Oh, 2020). Conversely, doing so irresponsibly can generate negative attitudes among opinion leaders and influencers (Zhou et al., 2019), as well as confusion among consumers about what sustainability and sustainable fashion is or is not (Henninger et al., 2016). For example, when brands focus solely on communicating the positive aspects of their environmental and sustainable actions on social networks, consumers may perceive this as an attempt to systematically conceal their shortcomings (Reilly & Larya, 2018). Additionally, it might be seen as an effort to "greenwash" their environmental image by conveniently leveraging the Sustainable Development Goals without genuinely being sustainable brands (Heras-Saizarbitoria et al., 2022). Thus, brands are increasingly interested in identifying the most effective strategies for generating favourable responses from consumers when communicating their sustainability efforts on social media platforms such as Instagram.

2.3. Fashion brands, engagement, and sustainable communication on Instagram

After Whatsapp (15.7%), Instagram is the second favourite platform internationally (14.8%) for social network users between the ages of 16 and 64. Marketers estimate that the potential international audience that brands can reach through Instagram ads is 1.5 billion users. Thus, Instagram ads can reach up to 18.7% of the global population, and its reach concerning total internet users is 29.9% (We Are Social & Hootsuite, 2022).

Likewise, topics related to sustainable fashion accounted for 37.4% of conversations on social networks in the United States, United Kingdom, and France, particularly on platforms such as Instagram and TikTok (Synthesio, 2022). For all these reasons, more and more fashion brands are using social networks, and especially Instagram, as a communication and sales channel, with communication on sustainability and its reputation being an important factor for younger consumers (Mckinsey & Company 2022).

In addition, compared to other social networks, Instagram turns out to be the most effective in generating user engagement (Stein et al., 2021), making it a key communication channel for fashion brands to connect directly with consumers when talking about sustainability (Bulmer et al., 2024). Within the universe of social networks, engagement (interaction between the sender and its followers measurable through "likes" and "comments") is considered one of the main indicators of communicative effectiveness for brands since it indicates a state of connection and commitment between the consumer and the brand (Cuevas-Molano et al., 2022). Previous studies have identified that engagement tends to correlate with perceived brand value and brand loyalty (Connell et al., 2019). Consequently, generating engagement with consumers is one of the great communication challenges that brands must face today. As a result, when it comes to boosting this engagement, brands must be careful in the design of their interaction strategies with network users by ensuring that their content generates desired responses. It seems necessary, therefore, to delve into those factors that can explain why consumers react with interest to some content but not to others (Chwialkowska, 2019).

According to Jones and Lee (2022), there are four categories of elements in fashion brands' Instagram posts that affect followers' engagement: the posts' messaging strategies, digital influencers, media types, and characteristics. Concerning messaging strategies, they found that the use of experiential, and emotional strategies significantly influenced engagement.

In the same line, Bonilla-Quijada et al. (2024) found that, among various communication strategies, the factor driving the highest level of interaction—measured through comments and likes—was the inclusion of the “Sales Response” variable (i.e., posts intended to generate an immediate sale). Additionally, the presence of people in the posts and the inclusion of products targeted at women also positively influenced the number of comments. Velasco-Molpeceres et al. (2022) also found that fashion brands' ability to generate engagement on Instagram is significantly higher when photographs are used compared to videos.

In this context, several studies have focused on analyzing and understanding the determinants of consumer engagement on Instagram when fashion brands discuss sustainability. Kwon & Lee (2021), for example, argue that the corporate social responsibility strategies of fashion brands on Instagram enhance the use of content related to the environment over other topics to generate engagement among their consumers. In turn, Milanesi et al. (2022) reinforce this idea based on an analysis of the images posted on Instagram of two sustainable fashion brands and establish differences in the reactions and level of engagement of consumers depending on their degree of identification and motivation with the context of the environmental images that these brands share with their followers. Zhao et al. (2021) emphasize the importance of followers and their engagement so that brands can reflect their values and corporate identity in the images and posts they share on Instagram, particularly those with messages related to sustainability. According to Testa et al. (2021), communication about sustainability in the fashion industry on Instagram is especially interesting for those consumers who are not familiar with the topic and how it applies to a particular fashion brand, while consumers who are more familiar with the sustainability of fashion brands show more engagement when there is new information about the brand or when it is presented uniquely and originally.

Although previous research on other social networks and other topics (Jaráiz Gulías et al., 2021; Moret Soler et al., 2022; Munaro et al., 2024) has highlighted the importance of linguistic

aspects related to message tonality (e.g., polarity, subjectivity, etc.) in driving engagement, no studies to date have examined the role of this variable in the context of fashion brand communication on Instagram.

In addition, even though engagement (which shows a reaction of interest on the part of users) can be understood as a relevant indicator of communicative effectiveness in social networks, it may be insufficient, since it does not necessarily reveal the degree of agreement (or disagreement) and acceptance (or rejection) that these users show in response to such communications. This is of particular interest since social networks offer a scenario in which consumers can express their ideas and opinions, and these are not always aligned with the messages issued by brands. Therefore, this research, apart from analyzing engagement, examines for the first time through automated semantic analysis algorithms the degree to which the comments generated by users – as a reaction to the posts published by fashion brands – are more or less positive (polarity). That is, this research not only seeks to analyze the degree of interactivity with brands but also the positive (and negative) nature of these interactions. Consequently, this research seeks to better understand the way in which the most sustainable fashion brands use Instagram to disseminate messages related to the field of sustainability as well as the responses and reactions of their followers. From this analytic framework, this article seeks to answer the following research questions:

- RQ 1. What percentage of their communication do sustainable fashion brands devote to sustainability-related issues? How has this evolved over time?
- RQ 2. Do the most sustainable fashion brands use different language tonality (i.e., polarity and subjectivity), when communicating about sustainability issues compared to when communicating about other issues?
- RQ 3. How do followers of those brands react to their posts on sustainability compared to their posts on other non-sustainability topics?
 - RQ 3.1. Do posts about sustainability generate more or fewer likes, comments, and engagement than posts dealing with other topics?
 - RQ 3.2. Were followers' comments on posts dealing with sustainability more or less positive than comments on posts dealing with other topics?
- RQ 4. What characteristics of posts dealing with sustainable topics are associated with higher numbers of likes, comments, and engagement?

3. Methodology

To answer the research questions, a quantitative content analysis of Instagram posts generated by the fashion brands considered most sustainable was conducted. (For studies with similar methodologies, see Castillo-Abdul et al., 2022; Heras-Saizarbitoria et al., 2022; Carrasco-Polaino et al., 2018)

3.1. Sample selection

To identify the fashion brands with the most sustainable behaviour, brands belonging to the ten corporations that ranked at the top of at least two of the five main corporate sustainability rankings in 2021 were selected (to see listed brands see Luna et al., 2023). The five rankings chosen to select the corporations were: Morgan and Stanley Capital International ESG rating (MSCI), Corporate Knights Global 100, Good on You, Fashion Transparency Index, and Standard and Poor Global ESG (S&P). The use of these rankings in previous research (Díez-Cañamero et al., 2020; Kwon & Lee, 2021) recognizes the importance in the reputational perception of the most sustainable companies and the efforts made by them in both the fashion and non-fashion sectors.

After the ten most sustainable organizations were selected, all the fashion brands belonging to these corporations were identified, resulting in a total of 61 (see appendix). Through the Instagram Profile Scraper tool (Phantombuster, 2021b) all the data of the user

accounts on Instagram of the 61 selected brands were obtained (date of account creation, number of posts, number of followers, etc.). Similarly, using the Instagram Post Extractor tool (Phantombuster, 2021a), all the posts (and associated metadata) generated by the brands were downloaded. Both the parent companies and their subsidiary brands have been examined as separate entities, as they appeared independently in the sustainability rankings, and each had distinct Instagram accounts (and possibly different communication strategies).

This process generated a dataset with 277,955 published posts. The oldest post included in the dataset was published on January 7, 2011, while the most recent one was published on December 10, 2021, the date when the data collection was completed. To identify those posts related to sustainability, we filtered those publications that contained specific words related to sustainability. Specifically, the same list of words previously used by Pilar et al. (2019) was used, among which, for example, words such as "sustainability", "recycled", "environment" and "waste" could be found. In turn, in a second step and as a control strategy, we searched within the identified publications for other words related to sustainability that were included in them but had not been used in the initial search. It was found that the terms "organic", "care" and "responsible" appeared recurrently, so they were included in the criteria and the search was run again (for a list of the terms used to identify sustainability-related posts see appendix). This process resulted in a sample of 12,639 publications dealing with sustainability.

In order to compare user reactions to different posts based on whether they mentioned sustainable topics or not, all comments made by users to posts published for one year (2021) were downloaded. This download generated a new dataset consisting of 838,285 records of which 156,761 were responses to sustainability posts and the rest, 681,524, to posts unrelated to sustainability.

3.2. Measures

Engagement: to measure the degree of interactivity within the publications, the engagement of each post was calculated. This was determined by using the sum of the interactions (likes and comments) received by each publication divided by the number of followers of the author of the publication (Herrera-Torres et al., 2017).

Like-ratio: Next, and taking into account, on the one hand, that likes and comments represent reactions of a different nature, since likes always indicate a favourable reaction while comments can be both favourable and unfavourable and, on the other hand, that a like does not imply the same level of interaction or engagement given that making a comment requires more time and effort on the part of its author (Ballesteros Herencia, 2018), two more indices (like-ratio and comment-ratio) were calculated. The like-ratio was calculated by dividing the number of likes on each publication by the number of followers.

Comment-ratio: the comment-ratio, was calculated by dividing the number of comments on each post by the user's followers. (To consult how these ratios have been used previously in similar research, see for example, Testa et al., 2021.)

Polarity index (sentiment): the sentiment or polarity index of each post (i.e., the extent to which the content of the post or comment is positive or negative) was calculated using the Text Blob Sentiment Analysis tool through Python (Oliphant, 2007). Text Blob is a library programmed in Python to process textual data. It provides an API to perform natural language processing (NLP) tasks such as part-of-speech tagging, noun phrase extraction, sentiment analysis, classification, and translation among other utilities. In this case, the polarity returned by the tool, using a lexicon method for each tweet, is a numeric value within the range [-1.0, 1.0] where -1 identifies a message with a very negative sentiment and 1 with a very positive one.

Subjectivity index: to study whether the texts disseminated objective content (i.e., facts) or whether they focused mainly on evaluations or opinions, a subjectivity index of each post was calculated. For this purpose, the same tool mentioned above was used to calculate the subjectivity of the texts. The calculation of subjectivity returns an index in the interval [0,1]

where 0 indicates an objective text (informative or descriptive) and 1 as a subjective text (evaluative or opinionated). The level of effectiveness of the tool used to calculate polarity and subjectivity has already been validated in numerous previous research (e.g., Carrasco-Polaino et al., 2021; Fauziyyah, 2020; Micu et al., 2017), with an average efficiency exceeding 95% and greater effectiveness compared to other similar tools (Alemán Viteri, 2021; Ccoya & Pinto, 2023).

The process by which the TextBlob library determines the polarity and subjectivity of a text begins with a lexicon-based analysis, utilizing a database of words associated with predefined values of polarity and subjectivity. In the second step, the provided text is divided into tokens, which are linguistic units (usually words or phrases). TextBlob tokenizes the text to analyze each word individually and determine its contribution to the overall sentiment. Finally, the library breaks the text into sentences to individually evaluate the polarity and subjectivity of each one. The total polarity and subjectivity scores for the text are obtained by averaging the values of all the sentences (Loira, 2018). Thus, each post or comment was classified according to the polarity and the subjectivity scale (for a similar measure of polarity and subjectivity see Bilro et al., 2022; for examples of polarity and subjectivity analysis using the TextBlob library, refer to the appendix).

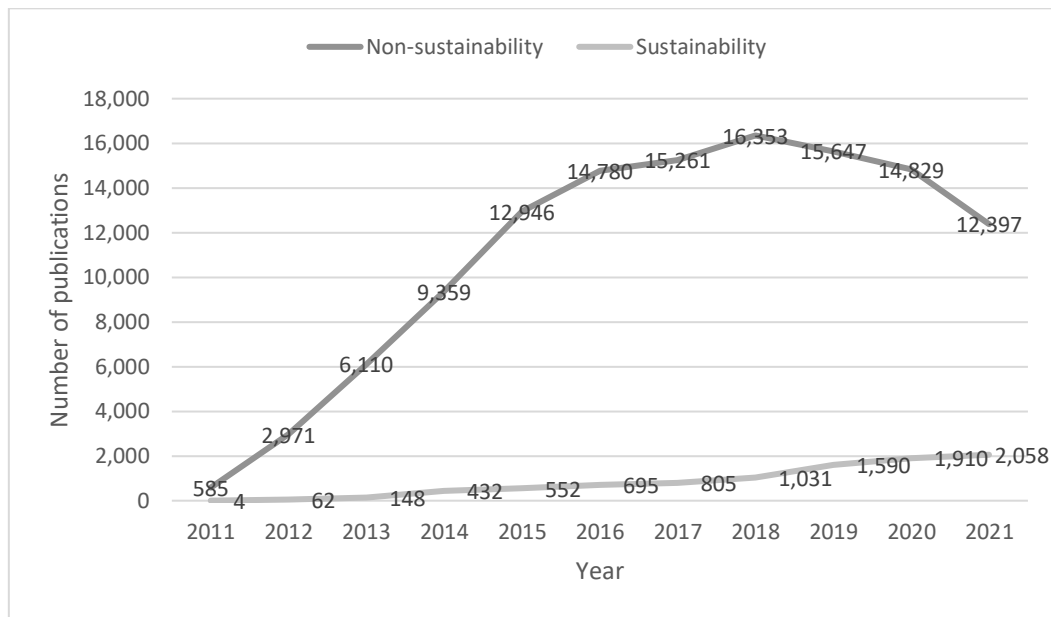
With all the data collected, we performed an inferential statistical analysis as the quantitative method. The data did not present a normal statistical distribution, so the models applied were nonparametric statistics. Thus, either the Mann-Whitney U test (MacFarland & Yates, 2016) or the Kruskal Wallis test (Ostertagová et al., 2014) was used to identify significant differences between groups depending on the number of groups to be analyzed, and the Spearman test was used to identify correlations (Restrepo & González, 2016).

4. Results

4.1. Presence of sustainability in brand communication

When analyzing the percentage of posts that sustainable fashion brands dedicated to topics related to sustainability, the data (Figure 1) show an uninterrupted increase in comments on this topic in Instagram publications since 2013 until being present in almost one out of every 10 posts (9.67%) published in 2021. One of the main factors that may have provided a notable boost in brands' commitment to this topic was the approval in 2015 of the 2030 Agenda (Pérez-Bou & Cantista, 2023), so between 2011 and 2015 posts on sustainability accounted for 3.6% of the total (1,198 compared to 33,169 on other topics), but after 2021 they represented 8.3% of the total (8,809 compared to 97,356).

Figure 1. Evolution of the number of publications on Instagram, 2011-2021



Source: Author's research

In turn, when analyzing the 10 companies that published the most posts on sustainability in absolute terms during this period (Table 1), it can be seen that, although the change in trend is beginning to be seen from 2013 onwards, this is not only not generalized, but is mainly due to two pioneering brands in this field, Patagonia and Girard-Perregaux, which multiplied by 8 and 40, respectively, their publications on this subject, thus anticipating the process that would follow. However, following the approval of the 2030 Agenda, a similar pattern can be seen in the other nine companies that had bet more on these contents in the last decade, as all of them now publish more on sustainability than before 2015. The increases range from 50% (H&M and Kering) to 15.45% for C&A, which goes from 2 publications in 2015 (none until then) to 309 in 2021.

Table 1. Frequency of publication of posts by brands year 2011 to 2021

Brand	Year											Total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
H&M HOME					5	89	51	74	155	130	127	631
C&A					2	21	19	41	20	171	309	583
Timberland	1	7	23	38	39	29	38	27	74	85	69	430
KERING				10	47	24	22	22	70	64	93	352
H&M				4	31	55	35	51	59	52	60	347
Patagonia		9	6	46	15	36	19	22	46	81	53	333
Alexander McQueen				1	8	8	25	68	55	102	62	329
Burberry	2	3	3	6	9	33	21	40	87	90	33	327
Girard-Perregaux			3	122	36	11	33	26	71	13	9	324
ARKET							27	53	55	89	88	312

Source: Author's research

Similarly, when sustainability-related posts were counted based on the total number of posts published by each of the brands, the result was a ranking of the ten brands that published the most sustainability-related content in relative terms (Table 2).

Table 2. Relative frequencies of posts related to sustainability with respect to the total (2011-2021)

Brand	Percentage of brand's total posts regarding sustainability
H&M HOME	31,97%
Napapijri	29,15%
C&A	26,55%
The North Face	22,57%
Comfort Colors	21,95%
ARKET	18,60%
KERING	17,43%
Icebreaker	17,35%
Ulysse Nardin	12,82%
Girard-Perregaux	12,37%

Source: Author's research

4.2. Engagement

When the engagement of posts was analyzed comparatively according to whether they were related to sustainability, the Mann Whitney test revealed significant differences. Specifically, posts related to sustainability obtained lower engagement ($M=0.39\%$; $SD=0.64\%$) than those dealing with other unrelated topics ($M=0.42\%$; $SD=1.39\%$) ($U=585,913,668.5$; $p<0.001$).

4.3. Like-ratio and comment-ratio

When the components of engagement were analyzed separately (likes and comments), each showed different trends. Specifically, when the likes or like-ratio (likes of each post divided by the number of followers) were analyzed using the Mann-Whitney test, significant differences were found ($U=585,734,592$; $p<0.001$) such that posts on sustainable topics obtained fewer likes on average ($M=0.39\%$, $SD=0.59\%$) than posts on topics unrelated to sustainability ($M=0.42\%$; $SD=1.27$). On the other hand, when the number of comments each post received (comment-ratio) was analyzed, it was found that posts on sustainability topics received, on average, a higher number of comments ($M=0.0081\%$; $SD=0.17\%$) than posts on non-sustainability topics ($M=0.0068\%$; $SD=0.36\%$) ($U=597,343,965$; $p<0.001$).

4.4. Polarity and subjectivity of fashion brand's posts

Regarding the verbal tone used by the most sustainable brands when they talk about sustainability on Instagram (compared to when they talk about other unrelated topics), both the polarity (degree to which the message is more or less positive) and the subjectivity (degree to which the message is more or less evaluative) of their publications were analyzed.

Regarding polarity, the Mann-Whitney U test revealed statistically significant differences were found ($U=588,841,034$; $p<0.001$). Specifically, publications on sustainability showed a more positive sentiment ($M=0.16$; $SD=0.23$) than the rest of the posts ($M=0.15$; $SD=0.25$). In other words, when brands talk about sustainability-related topics they tend to use more positive language. It is worth noting that, although sustainability-related posts exhibited a more positive sentiment, the overall sentiment (0.16 on a scale from -1 to 1) was only slightly positive.

Likewise, the analyses revealed that posts generated by brands that dealt with sustainability used more subjective language ($M=0.37$; $SD=0.28$) than that used in the other posts ($M=0.32$; $SD=0.31$) ($U=621,502793$; $p<0.001$).

4.5. Polarity and subjectivity of users' comments

First, polarity and subjectivity for the user's comments generated by followers to each of the posts published in 2021 by the fashion brands ($n=822,248$) were calculated using the same method (Text Blob Analysis tool through Python) that was applied to the fashion brands' posts. Next, the results of the mean comparison conducted using the Mann-Whitney U test revealed that posts dealing with sustainability topics had more positive comments ($M=0.078$; $SD=0.11$) than those dealing with other topics ($M=0.058$; $SD=0.087$) ($U=13,472,361$; $p<0.001$).

Similarly, regarding the subjectivity of the comments, the analyses revealed that followers' comments were more subjective and contained more evaluative language when responding to those posts related to sustainability ($M=0.14$; $SD=0.15$) than when responding to posts published by the brands in which no reference to sustainability was made ($M=0.11$; $SD=0.11$) ($U=134,451,092.5$; $p<0.001$).

4.6. Variables associated with engagement in sustainability posts

Finally, we analyzed in isolation the posts that dealt with the topic of sustainability to examine which characteristics could be linked to higher engagement. The Spearman correlation test revealed a significant correlation between the subjectivity of the posts and engagement ($R_{ho}=0.029$; $p<0.001$) indicating that to some extent those posts that present more subjective language tend to generate greater interaction.

Similarly, when the components of engagement were analyzed separately, significant correlations were identified between the subjectivity of posts and like-ratio ($R_{ho}=0.028$; $p=0.006$) as well as between subjectivity and comment-ratio ($R_{ho}=0.033$; $p=0.001$). In other words, the greater the subjectivity of the content, the greater the number of likes and comments.

No significant relationship was found between the polarity (sentiment) of the post and the engagement rate. When the components of engagement were analyzed separately, no association was found between the number of likes and the polarity of the post. However, a significant correlation was detected between comment-ratio and post polarity ($R_{ho}=0.022$; $p=0.032$), indicating that the higher the positive sentiment of the posts that brands make on sustainable topics, the higher the number of comments generated by followers.

Also tested was whether the use of more terms related to sustainability would generate higher engagement. For this, the correlation between the number of words related to sustainability that appeared in each of the posts published by the brands on sustainable topics and the engagement generated by them was calculated. The result showed a negative correlation ($R_{ho}= -0.06$; $p<0.001$), indicating that the higher the number of terms related to sustainability, the lower the engagement.

When each of the engagement components was analyzed separately, the number of terms related to sustainability did not show a significant association with comment-ratio, but it did with like-ratio ($R_{ho}= -0.06$; $p<0.001$), showing that the more terms related to sustainability appeared in the publication, the lower the number of likes it received.

Finally, the difference in the engagement of posts was compared according to the format through the Mann-Whitney U test, that is, whether they included a video or a static image as the main element of the publication. The results showed statistically significant differences ($U=4,498,365$; $p<0.001$). Specifically, the publications that presented an image as the main element obtained higher engagement ($M=0.42\%$; $SD=0.59\%$) than those that included a video ($M=0.26\%$; $SD=0.81\%$).

Going deeper into the analysis of interactions according to the post format, differences were found in both comment-ratio ($U=6,500,301.5$; $p<0.001$) and like-ratio ($U=4,486,710$; $p<0.001$) according to whether the post contained a video or an image. In the case of likes, publications with an image obtained higher values ($M=0.0041$; $SD=0.0053$) than those showing a video ($M=0.0025$; $SD=0.008$), as well as a higher rate of comments ($M=0.000089$; $SD=0.0018$) than publications with a video ($M=0.000047$; $SD=0.00046$).

5. Discussion

5.1. General discussion

In recent years, because of associated reputational and economic benefits (Alcaide González et al., 2020; Pelosa et al., 2012; Barnett & Leih, 2018; San Miguel et al., 2021), there has been an increasing commitment by brands, including those in the fashion industry, to convey the perception of a sustainable company (Reilly & Larya 2018).

In turn, social networks in general, and Instagram in particular, have become one of the main showcases to transfer this interest about sustainability to the market and customers (Kwon & Lee, 2021; Lee & Weder, 2021). However, there is still a long way to go to understand how and to what extent the efforts made by brands through these channels are or are not effective. Therefore, this research aims to contribute to an understanding of how the most sustainable fashion brands use Instagram to disseminate messages related to the field of sustainability as well as how such communications are received by their followers, not only in terms of the interactivity they generate (engagement), but by analyzing for the first time, the polarity (i.e., positive or negative sentiment) of users' comments toward these messages. The use of automated semantic analysis tools has made it possible to examine a significantly larger sample of brands and their publications than those analyzed in previous research.

For RQ 1, the data showed that sustainability content on Instagram, even among the most sustainable brands, represents a small percentage of their communication strategy although it has continued to grow since 2013. Today, they represent one of every 10 posts, which denotes an increasing interest in the most sustainable brands in communicating this type of content. These findings contrast with the previous research by Velasco-Molpeceres et al. (2023), in which sustainability-related posts accounted for nearly 50%. However, it is important to note that their study was based on a smaller sample of only five brands.

In RQ 2, the analyses revealed that these publications on sustainable topics use more positive and subjective language than the rest of unrelated posts. In other words, it seems that brands probably make a deliberate effort to communicate in a particularly positive and emotional way the measures and actions they are carrying out in this field, and in line with the positive effects (tangible and intangible, economic and reputational) they entail.

Despite this eagerness to convey a positive message, posts about sustainability get less engagement than the average (RQ 3.1), which indicates that compared to the rest of the topics addressed by brands, those related to sustainability issues arouse comparatively less interest. These results are in line with previous research where sustainability-related posts generated lower engagement than posts related exclusively to fashion or lifestyle (Testa et al., 2021). However, when analyzing each of the engagement components (likes and comments) separately, a revealing difference was found. Posts that address sustainability receive fewer likes but generate more comments from followers. One way to interpret this apparent contradiction, which justifies the convenience of analyzing the two components of engagement separately, is to understand that likes and comments are indicators of interest, but of a different nature and at different levels. Specifically, comments reveal a greater interest and engagement on the part of the user since commenting on a post requires more effort than simply clicking a like button (Ballesteros Herencia, 2018). Thus, it could be argued that, although posts about other types of content generate greater surface-level interaction (likes), posts about sustainable content generate deeper interactivity. This could indicate that, in line with what other previous research

has established (e.g., Matthes et al., 2014), there is a group of users and consumers who are aware of sustainability and who transfer that commitment and interest to social networks as well.

Likewise, another aspect to consider is that likes are always a sign of agreement and acceptance of the content posted while comments can be both positive and negative. In this case, the results showed that messages linked to sustainability not only generated more comments but also that they are more favourable than the average (RQ 3.2). In turn, the language of the comments directed at publications related to sustainable issues was more subjective, indicating that the users' response was more emotional and appreciative, most likely because it represented an issue of special relevance to them. This indicates that there is an engaged audience that shows a real interest in this type of content published by fashion brands.

In addition, when the set of publications dealing with sustainability-related topics was analyzed separately, the data revealed the existence of certain factors that were associated with higher engagement (RQ 4). Specifically, the results suggest that if brands want to generate the highest number of likes and comments when communicating sustainability-related topics, the most advisable strategy would be to use evaluative and emotional language, a positive and favourable tone, not to abuse the use of sustainable terms, and to use images instead of videos. The fact that the more evaluative terms generate more engagement than more informative expressions is in line with the results obtained in research focused on health-related topics where the use of emotional elements (such as personal stories or emojis) increased the interactivity of the messages (Gabarron et al., 2020; Kearney et al., 2019). On the other hand, according to existing research and reports in other fields (Galeano, 2021), it is uncommon for images to generate more engagement than videos on Instagram. However, our findings align with those of Velasco-Molpeceres et al. (2022). Although it is not possible to provide a definitive explanation for this discrepancy, a potential reason could be related to specific characteristics of the fashion sector, such as its inherently visual and aesthetic character, the profile of the consumer user, etc. However, future research could address this aspect more systematically.

Taken as a whole, these findings seem to suggest that introducing sustainability issues in communication, which the most sustainable fashion companies do on Instagram, is a recommendable strategy that provokes positive interactivity on the part of users, followers, and consumers. In turn, it should not be forgotten that this positive effect can be related to the fact that the fashion brands analyzed in this research are brands that are truly committed to sustainability (having been placed at the top of the rankings) and it is reasonable that they have followers who are also committed.

5.2. Conclusions, limitations, and future research agenda

In summary, the present research contributes from both a theoretical and a practical point of view. From a theoretical point of view, these findings provide evidence about the positive reaction that audiences of the most sustainable fashion brands arouse when they communicate about sustainability on Instagram. Moreover, from a methodological point of view, these findings suggest the importance of understanding engagement as a measure of communicative effectiveness that needs to be broken down into its principal components to discriminate between different levels of interaction. At the same time, the findings point out the convenience of not being limited to assessing interactivity as the only criterion of communicative effectiveness in networks but also raises the relevance of analyzing the favourability of such interactions. Additionally, the use of automated semantic analysis tools is shown to be a methodological strategy that allows a greater quantity of data to be processed and, consequently, a more representative sample to be covered.

Finally, from a practical standpoint, our findings allow us to offer useful, data-driven suggestions on how truly sustainable brands can communicate sustainability-related topics and news on social networks like Instagram in an effective way that helps spark interest and generate positive dialogue with their audience.

Future research should check what happens when this same strategy is adopted by companies whose activity is not as sustainable as it could provoke indifference on the part of less-committed followers or could even be seen as a gesture of hypocrisy on the part of more conscientious followers. In a similar vein, this study analyzed fashion brands with different profiles jointly (e.g., luxury brands, fast fashion brands, home brands, etc.). Future research could benefit from focusing on specific profiles to explore potential differences between them.

Similarly, future research can benefit from studying possible differences depending on whether the selected brands belong to the luxury brand category or mass-market brands. Lee et al. (2018) for example, showed on Twitter that users responded differently to sustainability messages depending on whether the brand was luxury or non-luxury. Finally, future studies could also be carried out on other platforms, such as TikTok, which, like Instagram, holds a strong presence in the field of fashion communication.

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