

How did sustainable Spanish and Italian brands communicate COVID-19 on social media?

Sustainable
Spanish and
Italian brands

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Abstract

Purpose – This study aims to determine how the most sustainable brands in Italy and Spain developed communication and awareness-raising actions during the COVID-19 pandemic and whether these companies were truly involved in raising public awareness of the pandemic. The authors specifically focus on sustainable companies, as health communication is considered to be an important corporate social responsibility task.

Design/methodology/approach – To answer these questions, the authors have used data on the social media activity (Twitter and Instagram) of these brands in Spain and Italy, extracting the posts and associated hashtags that each of them has published throughout the pandemic to be processed using social network analysis and visualization techniques.

Findings – The detailed analysis of both the levels of activity and the content of the messages provides interesting insights into the communication models of the companies and the influence of factors such as time, country and the specific social media platform used.

Originality/value – The authors analyze the communication of the most sustainable businesses on social media during the pandemic, adopting a highly innovative approach. The particular originality of this study lies in the parallel analysis of two different countries that were simultaneously shaken by the pandemic in very similar circumstances. This study also presents a novel use of graphical representation tools in terms of companies' behavior for health communication on social media.

Keywords COVID-19, Sustainable brand health communication, Social media, Discourse analysis, Hashtags, Social network analysis and visualization

Paper type Research paper

¿Cómo comunicaron las marcas sostenibles españolas e italianas la COVID-19 en las redes sociales?

Resumen

Objetivo – El objetivo de esta investigación es determinar cómo las marcas reconocidas como las más sostenibles en Italia y España han desarrollado acciones de comunicación durante la pandemia del Covid-19 y si estas empresas se han involucrado realmente en la sensibilización pública de la pandemia. Nos centramos

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específicamente en las empresas sostenibles dado que la Comunicación en Salud se considera una tarea importante de responsabilidad social corporativa.

Diseño/metodología/enfoque – Para responder a estas preguntas, hemos utilizado datos de actividad en medios sociales (Twitter e Instagram) de estas marcas en España e Italia, extrayendo los posts y hashtags asociados que cada una ha publicado a lo largo de la pandemia para procesarlos usando técnicas de análisis y visualización de redes sociales.

Resultados – El análisis detallado tanto de los niveles de actividad como del contenido de los mensajes permite obtener conclusiones interesantes sobre los modelos de comunicación de las empresas y la influencia de factores como el tiempo, el país y el medio social concreto utilizado.

Originalidad – Analizamos la comunicación realizada por las compañías más sostenibles en medios sociales durante la pandemia, adoptando un enfoque muy innovador. La particularidad de este estudio radica en el análisis paralelo de dos países diferentes que fueron sacudidos simultáneamente por la pandemia en circunstancias muy similares. Este estudio también conlleva un uso novedoso de herramientas de representación gráfica en términos del comportamiento de las empresas para Comunicación en Salud en medios sociales.

Palabras clave Covid-19, Comunicación en Salud de empresas sostenibles, Medios sociales, Análisis del discurso, Hashtags, Análisis y visualización de redes sociales

Tipo de artículo Trabajo de investigación

西班牙和意大利的可持续品牌是如何在社交媒体上传播Covid-19的？

摘要

目的 – 本研究的目的是确定在意大利和西班牙被认为是最可持续发展的品牌在Covid-19大流行期间是如何开展传播行动的, 以及这些公司是否真正参与了提高公众对该大流行病的认识。我们特别关注可持续发展的公司, 因为健康传播被认为是企业社会责任的一项重要任务。

方法 – 为了回答这些问题, 我们使用了这些品牌在西班牙和意大利的社交媒体活动数据 (Twitter和Instagram), 提取了每个品牌在整个大流行期间发布的帖子和相关标签, 并使用社交网络分析和可视化技术进行处理。

结果 – 通过对活动水平和信息内容的详细分析, 可以得出关于这些公司的传播模式以及诸如时间、国家和所使用的特定社交媒体等因素的影响的有趣结论。

原创性/价值 – 我们分析了最可持续的公司在大流行期间在社交媒体上进行的传播, 采取了一种非常创新的方法。这项研究的特殊性在于对两个不同国家的平行分析, 这两个国家在非常相似的情况下同时受到大流行病的冲击。这项研究还包括在社交媒体上对公司健康传播行为的图形表示工具的新颖使用。

关键词 Covid-19, 可持续商业健康传播, 社会媒体, 话语分析, 标签, 社交网络分析和可视化。

文章类型 研究型论文

1. Introduction

The scale of the COVID-19 public health emergency is unmatched in our lifetime and has had serious social and economic consequences (United Nations, 2020). In March 2020, there was strict worldwide confinement due to the rapid spread of the COVID-19 pandemic. This meant that all our offline, i.e. face-to-face, social interactions were either moved to social networks or lost. Because of this, many of us spent much of the lockdown periods that were implemented in different countries interacting with other individuals through social networks, dramatically increasing the use of social media (Ferrer Serrano *et al.*, 2020).

Due to this increased interaction on social media, there was an impressive increase in comments, news and hoaxes about the pandemic. On the positive side, governments and public health agencies have made extensive use of launching campaigns to raise awareness of risks and disseminate protective actions and protocols (Wang *et al.*, 2020; Malik *et al.*, 2021; Santoveña-Casal *et al.*, 2021). On the negative side, the fear of the unknown along with the lockdown resulting from COVID-19 created a breeding ground for strong misinformation, giving rise to many conspiracy theories. Some global health officials

warned that the spread of “fake news” could exacerbate the spread of COVID-19, stating that “we are not just fighting an epidemic; we are fighting an infodemic” (Cotter *et al.*, 2022). The pandemic also totally changed the paradigm for most companies, which could not interact with their potential customers as they had done previously. This forced them to increase their presence on the internet and to digitize the vast majority of their processes if they wanted to continue with their business activity (Almeida *et al.*, 2020).

This increase in the use of social media by companies during the pandemic motivated us to carry out the current study (Wong *et al.*, 2021). This new scenario involves the emergence of new patterns of interaction among governments, citizens and technology (Santoveña-Casal *et al.*, 2021), specifically between companies and citizens. Therefore, companies can support public health policies by increasing citizenship awareness, and these kinds of communication campaigns can also be understood as a corporate social responsibility (CSR) activity (Xie and Wang, 2022) included within the framework of health communication (Afful-Dadzie *et al.*, 2023). Therefore, we are faced with an unprecedented situation in which a large amount of information is available. This allowed us to track the changes in the communication models of companies resulting from these social behavior changes.

The starting point of the current study is the assumption that the dissemination of information related to COVID-19 made by private companies can be useful as a complement to the actions taken by public institutions and society regarding citizen awareness about a risk situation (Santoveña-Casal *et al.*, 2021). Hence, we aim to study the actual involvement of sustainable Spanish and Italian companies in social media during the pandemic. The reason for choosing these two countries is that Spain and Italy share important similarities in terms of historical development, economic structure, culture (Gërkhani, 2020; Hofstede *et al.*, 2005) and institutional health-care agreements (Cappellaro *et al.*, 2009). They share a similar economic trajectory accentuated since the 2008 crisis when both suffered strong austerity imposed by the European Commission (Picot and Tassinari, 2014), thus, tending toward a homogeneous situation in their political and economic decision-making. In addition, both Spain and Italy have historically allocated significant funds for the operation of their health systems, raising awareness in their respective societies and becoming world leaders (Brusca *et al.*, 2015). Recently, they were simultaneously shaken by the COVID-19 pandemic in very similar circumstances. As a consequence of all the above, it is interesting to compare the health communication strategies of their brands in the face of the pandemic with respect to the similarities in the content of their messages and their commitment to CSR. This study would not make sense if other countries that are further away both geographically and culturally (such as Scandinavians or Anglo-Saxons) were analyzed, since the health communication developed by public institutions and disseminated by the sustainable private companies would be less homogeneous.

Our main objective is to analyze the similarities and differences in the social media presence, activity and communication strategies of those companies, as well as their evolution over the entire pandemic period [1]. To achieve this objective, we selected the companies that have been identified as the most sustainable in Spain and Italy. We built a data set by scraping every post made on two of the most used social media platforms today, Twitter and Instagram, during the first six waves of COVID-19 in both countries. The message content is commonly based on the use of hashtags associated with COVID-19 campaigns, most of which have been launched by the Spanish and Italian Governments on both platforms. Hence, we extracted the hashtags included in those posts as the concrete expressions of the messages about the pandemic that the companies communicated. Then, we built different social networks from these data to represent the underlying relations and obtained some visualizations based on social network analysis techniques (Wasserman and Faust, 2012).

Through this analysis, we were able to study in detail the different relationships between companies and hashtags, drawing conclusions regarding the communication strategies that were followed by the brands.

This research led us to ask ourselves the following questions:

- RQ1. Have the most sustainable companies truly been involved in raising societal awareness about COVID-19?
- RQ2. Have Spanish and Italian companies acted in the same way with respect to their communication activity during the COVID-19 pandemic?
- RQ3. Have they followed a solid and continuous communication strategy in social media throughout the pandemic, *regardless of the country*?
- RQ4. Have they constructed a different message depending on the social media used? and
- RQ5. Is it necessary to conduct an in-depth study for companies that aim to be sustainable in regard to their communication with society in future pandemics, which will need to include appropriate language and permeate the population?

2. Literature review

Since their origin, social networks have allowed us to express our emotions and opinions, as well as to exchange information with communities (Poell, 2014; Martín *et al.*, 2016). User posts on social media can be analyzed to measure different characteristics of the population, including public health measures. During a pandemic such as that of COVID-19, social media ideally facilitates the rapid dissemination of new and important information about risks and personal protective actions (Wang *et al.*, 2020), the sharing of diagnostic treatment experiences and follow-up protocols and the provision of information to patients to raise their awareness about the situation and prevent the spread (González-Padilla and Tortolero-Blanco, 2020). Social media can also be harnessed by medical experts to quickly counter false or falsified information with accurate advice (Amanatidis *et al.*, 2021).

Organizations also had to respond to the pandemic. Data show, for example, that virtually all international companies with competencies in health have profiles on social media platforms (Petersen and Gerken, 2021). However, this health communication work in drastic situations such as a pandemic is a task not only for organizations with health competencies but also for all companies (Pöyry *et al.*, 2022; Hove, 2023).

2.1 Health communication and social media

Health communication, which has been researched for more than 40 years, focuses on the influence that communication has on aspects related to the health of a population. The main objective of this communication is to influence individual and collective decisions that lead to improved health (Renaud and de Sotelo, 2007). Therefore, health communication plays a determining role in society, and the ability to communicate quickly and transparently is essential for the effective management of a public health emergency (De las Heras-Pedrosa *et al.*, 2022).

The vast potential of social media platforms for information dissemination has been used over the years to make a positive impact on society. Social media can be used to reinforce public health communication efforts and raise awareness of different diseases, as was the case with the amyotrophic lateral sclerosis (ALS) Ice Bucket Challenge in 2014 (Koohy and Koohy, 2014). Other examples of such health communication include campaigns to stop smoking

(Naslund *et al.*, 2017) and the campaign that used the hashtag #smearforsmear to raise awareness about cervical cancer (Lenoir *et al.*, 2017). These initiatives take advantage of the network effects of social media to multiply the impact of public health actions, thereby establishing a conversation and engagement with the public, which is a key pillar of digital marketing initiatives (Awais *et al.*, 2022).

2.2 Social media platforms as means of communication during the COVID-19 pandemic

Sustainable enterprises are defined as those that are “economically viable, socially beneficial and environmentally responsible” (Elkington, 1998). Fernández and Pinillos (2011) define sustainability as a natural progression of the concept of CSR, and the objective is to link this term to the value and business heart of each company. Companies seek to create the maximum possible value for society, and to do so, need to make a series of changes. These changes begin with the use of social media for analyzing, planning, executing and evaluating the strategies designed to influence consumer behavior and improve the quality-of-life of consumers and society (Wibowo *et al.*, 2020). Thus, increasing citizen awareness about the different aspects of a pandemic, such as policies and best practices, is an important health communication venture and can be understood as a CSR activity that can contribute to supporting the public health policies of public institutions (Xie and Wang, 2022), as well as responsible citizenship (Santoveña-Casal *et al.*, 2021).

As in previous crises, the COVID-19 pandemic has led to an interesting spike in the use of media (Ferrer Serrano *et al.*, 2020). In particular, social media were the fourth most consumed entertainment activity in Spain during the lockdown by 39% of the population [2]. In Italy, 50% of citizens reported that their use of YouTube increased or increased significantly during that period compared to 43% who did not change their consumption habits [3]. Fifty-two percent and 49% of Italian and Spanish citizens, respectively, also reported spending more time on social media, both above the global average of 44% [4].

Twitter has been considered a very important social network during the COVID-19 health emergency (Bal *et al.*, 2020) and has been positioned as an effective channel for the rapid transmission of information in times of crisis such as pandemics, natural disasters and humanitarian crises (Fernandez-Luque and Imran, 2018; Pourebrahim *et al.*, 2019) that allows us to measure the sensitivity of the population to a complicated or adverse situation.

On the other hand, Instagram is very useful and effective for communicating risk because visual elements attract relatively more attention and help users remember and reinforce information, which is conveyed through text and hashtags (Merchant, 2011). During emergencies and health crises, such as COVID-19, organizations can use images to convey messages of prevention and public concern (Guidry *et al.*, 2017).

Instagram can, thus, be an effective tool for organizations to convey their messages during a pandemic situation, particularly through engaging celebrities, posting clarifications and using infographics. In addition, it allows us to strengthen the role of organizations in countering misinformation on social media by providing accurate information and referring users to credible sources (Malik *et al.*, 2021).

2.3 Importance of hashtags in communication strategies in social media

We decided to use the social media platforms Twitter and Instagram as data sources for our study because of their common communicative elements, including hashtags, on which we focus. Hashtags play a crucial role in developing interest on social media, allowing us to categorize images, messages or any type of publication so that we can later perform relevant searches for publications that have the same hashtag. They help boost the presence of any

social media account, as they make content visible by anyone who has an interest in the specific hashtag, transcending the followers of a given account.

Twitter is the network on which hashtags have the most impact, as they are considered a very effective tool for driving engagement toward a brand, making it practically indispensable for a company to have a Twitter account and know which hashtags to post so that users receive and understand its messages. For Instagram, hashtags are mainly used to make it easier for users to discover new images, since otherwise photos would be kept private, meaning that only your followers would see your posts (A1 Future Technologies - Blog, 2018).

The importance of hashtags has been demonstrated by different works. Martín *et al.* (2016) showed that the use of hashtags, even if they are random, increases the number of followers on Twitter compared to users who do not post any hashtags. In addition to the positive influence of hashtags on social media user engagement, their importance in the communication process in modern online discourse has also been highlighted in recent years. For example, Laucuka (2018) showed that hashtags are a meaningful part of spreading a message and identified ten of their various communicative functions.

Hence, to develop our study, we made use of data analysis methods from the hashtag analysis field. These methods are a very good alternative for analyzing the content of a message on social media, i.e. to perform discourse analysis in digital communication environments (Izotova *et al.*, 2021). It, thus, becomes a simplified approach to content analysis (Pilar *et al.*, 2019). Social media content analysis based on hashtags has been used in many areas, such as activist communication (Poell, 2014), discursive strategy analysis in strategic speech (Giglietto and Lee, 2017) and sustainability (Pilar *et al.*, 2019).

In our case, we conducted an analysis in which we sought to understand how the specific messages that different companies have tried to convey in relation to COVID-19 have transformed along with the pandemic evolution. We analyzed the evolution of the frequency with which companies posted because we wanted to understand how committed each company was to the pandemic, both in each specific period and overall. We also identified the existing relationships among different companies in terms of the communication strategy used, i.e. companies that have published similar or different messages, which is represented by the hashtag group that is considered.

3. Materials and methods

3.1 Data acquisition

We want to analyze a set of companies and the hashtags they published on social media during a certain period. To select which companies to study, we decided to focus on sustainability, since companies currently need to work on more than just the quality of their products. Instead, the social and ethical responsibility, as well as sustainability (Mena *et al.*, 2019), of a company are becoming increasingly valued by customers, thus, becoming decisive factors at the time of purchase.

We have resorted to the Dow Jones Sustainability World Index study (RobecoSAM AG, 2019), which lists the companies that are considered to be the most sustainable in the world. Thus, we have obtained a total of 15 Spanish and 12 Italian companies (Table 1). The Spanish brands belong to different industrial sectors, including banks, energy, insurance, fashion and construction. Meanwhile, Italian companies are in the energy, automotive, banks, fashion, insurance and communication sectors.

Once we knew which companies were to be analyzed, we looked for their respective accounts on the two social media platforms that we considered as data sources, Twitter and Instagram, and scraped all the publications made during the considered period. In this research, we complied

Country	Company	Twitter	No. of hashtags Instagram	Total
Spain	<i>BBVA</i>	8,553	2,926	11,479
	<i>Naturgy Energy Group</i>	4,927	3,904	8,831
	<i>Mapfre</i>	6,538	1,461	7,999
	<i>Iberdrola</i>	5,149	2,822	7,971
	<i>CaixaBank</i>	4,502	1,833	6,335
	<i>Endesa</i>	4,958	800	5,758
	<i>Bankinter</i>	4,536	880	5,416
	<i>Amadeus IT Group SA</i>	3,510	191	3,701
	<i>Red Eléctrica</i>	3,444	0	3,444
	<i>Enagas</i>	2,609	0	2,609
	<i>Ferrovial</i>	2,315	222	2,537
	<i>Banco Santander</i>	1,156	892	2,048
	<i>Indra</i>	1,225	209	1,434
	<i>Inditex</i>	107	1,139	1,246
Italy	<i>ACS</i>	0	0	0
	<i>Poste Italiane</i>	3,325	1,434	4,759
	<i>Terna Rete Elettrica Nazionale</i>	3,243	1,064	4,307
	<i>Intesa Sanpaolo</i>	3,187	370	3,557
	<i>Snam</i>	709	1,609	2,318
	<i>Assicurazioni Generali</i>	1,485	503	1,988
	<i>Italgas</i>	1,406	455	1,861
	<i>Pirelli and C</i>	563	996	1,559
	<i>Moncler</i>	127	1,362	1,489
	<i>Leonardo</i>	753	334	1,087
	<i>Enel</i>	1,073	1	1,074
	<i>Prysmian</i>	657	289	946
	<i>Saipem</i>	0	602	602
<i>Total</i>		70,057	26,298	96,355

Table 1.
Number of hashtags
by company and
social media

with the ethical guidelines at the hosting institutions by following the principles of data minimization and proportionality. Data security measures are implemented, and only information that the legal entity has made public is used (hashtags contained in the public messages of the companies' accounts, which are also public in every case). We used two scraping tools developed in Python, *Tweepy* for Twitter (www.tweepy.org/) and *Instaloader* for Instagram (<https://instaloader.github.io/>). For the case of Twitter, *Tweepy* directly accessed the twitter application programming interface (API) based on an academic project created in the Twitter developer portal and approved last February 18, 2022 with App ID 23478549. For the case of Instagram, *Instaloader* is an open software with an massachusetts institute of technology (MIT) license that does not extract any private user data, such as e-mail addresses, gender or location. It only scrapes what users have chosen to share publicly, in the same way as if a manual acquisition were developed from the corresponding public Instagram pages using the web browser. In any case, the researchers have followed the guidelines established in the conditions of use of Meta for developers and in Meta's policy of use of Open Data Access.

The data from January 1, 2020 to February 17, 2022 were downloaded. This period corresponds to the six first waves of COVID-19 in both countries, and it also includes the two and a half months before the start of the pandemic in Europe in 2020 to be considered as a reference. We selected the specific periods associated with the different waves in each country from the web page "Our World in Data" (Ritchie *et al.*, 2020).

The results of the data extraction can be seen in [Table 1](#), where the overall number of hashtags published by each company on both social media platforms over the whole period, both related and unrelated to COVID-19, is reported.

In this table, we can observe that the Spanish company ACS does not have any activity on either Twitter or Instagram. On the other hand, there are companies that do not have a presence on Twitter, such as the Italian *Saipem*, and others that do not have a presence on Instagram, such as *Red Eléctrica* and *Enagas* (Spain), and *Enel* (Italy). Of course, these were left out of the study of the social media on which they have not published any hashtags or of the two social media in the case of ACS. Later, we demonstrate how, through the process of filtering hashtags, some companies are also left out of the study for not having published any hashtag related to the pandemic, as is the case of the Spanish *Inditex*.

3.2 Procedure

Our research relies on both a quantitative analysis (descriptive analysis) and a qualitative analysis (discourse analysis). The quantitative analysis is used to obtain insights into companies' activity on Twitter and Instagram and their evolution during the pandemic period. Meanwhile, the qualitative analysis is focused on analyzing the content of the disseminated awareness messages about the COVID-19 situation to identify the communication strategies followed by the companies and their evolution. As described, hashtag analysis methods will be used to perform discourse analysis. Social network analysis and visualization will be considered to relate companies and messages (hashtags) to determine the communication strategies.

3.3 Data filtering and hashtag grouping

Extracting hashtags from the text of posts is not a difficult task and can be done automatically. Nevertheless, there is a need for a human filtering process to select which hashtags fit our study. In addition, the use of the selected hashtags in the six time periods considered, corresponding to the six COVID-19 waves, must also be identified through a time filter, since we also analyze how the hashtags have varied throughout the pandemic.

Even so, when we finished selecting the final set of hashtags, we obtained a large list. When analyzing it carefully, we observed that many hashtags, although different, aimed to give the same message. For example, although they are different hashtags, both *#QuedateEnCasa* (meaning “*stay at home*” in English) and *#YoMeQuedoEnCasa* (“*I stay at home*”) seek to convey the need to stay at home to try to stop the pandemic, which is expressed by public health agencies and the respective governments.

Thus, we decided to unify groups of hashtags with the same meaning since we conducted this analysis of social networks to understand which companies wanted to convey the same message to their followers, not only to study the hashtags that have been used the most. In regard to the graph, if there is a unification of hashtags that relates two companies, it is because they wanted to convey the same message (i.e. they followed the same communication strategy) without the need to have used the same specific hashtag. Note that this procedure is also useful for integrating posts in two different languages, Spanish and Italian, into a common study. The first column in [Table 2](#) shows the hashtag groups extracted, with their original text either in Spanish, Italian or English, and the English translation if required. The second column reports the number of original hashtags collected in each respective hashtag group. In addition, [Table 2](#) in the Online Annex of the

Table 2.
Groupings of
hashtags according
to their message

Representative hashtag (English translation)	No. of hashtags in the hashtag group
#QuedateEnCasa (<i>StayAtHome</i>)	4
#Covid-19	3
#vacunaCovid19 (<i>Covid19Vaccine</i>)	12
#EsteVirusLoParamosUnidos (<i>WeWillStopThisVirusTogether</i>)	8
#AplausoSanitario (<i>ThanksHealthcareWorkers</i>)	7
#FrenarLaCurva (<i>FlattenTheCurve</i>)	1
#confinamiento (<i>Lockdown</i>)	5
#estadoDeAlarma (<i>StateOfAlarm</i>)	5
#facemask	9
#teletrabajo (<i>Telecommuting</i>)	10
#stopCoronavirus	3

manuscript, available at <https://hdl.handle.net/10481/82029>, also reports the specific hashtags in each group.

3.4 Data processing and network construction

We represent the activity of each company in the publication of hashtags on each social media platform by building a series of bipartite social networks (Wasserman and Faust, 2012). To do so, we preprocessed the rough data corresponding to the representative hashtags published by each company account on each social media platform during each specific period. Each bipartite network is, thus, composed of two types of nodes, companies and hashtags. An asymmetric adjacency matrix indicates the number of times a company has posted a hashtag on a specific social media platform during the analyzed time period. In this way, the network structure obtained is a weighted, undirected bipartite network since there could only be relations (edges) between nodes of the two different types. The edges are necessarily undirected, since when a company posts a hashtag, that hashtag has of course been posted by the company. In addition, they are weighted, thus, indicating the “strength” of the company-hashtag relationship (i.e. the influence of the hashtag message in the company’s communication strategy).

In addition, two projections can be generated from each bipartite (company-hashtag) network. We are interested in the company network, which represents the relationships among the companies according to the communication strategies followed. This network is composed of one node per company and a set of weighted edges indicating the number of times they have posted the same hashtag groups. Thus, no edge will appear between two companies if they do not share any hashtag in the original bipartite network, showing that the messages communicated by both companies are completely different. In contrast, the more times two companies have posted common hashtags, the greater the associated weight and, therefore, the greater the similarity between their communication strategies.

3.5 Network visualization

The Gephi tool (<https://gephi.org/>) was used to analyze the generated networks to develop our study. This tool includes different layout algorithms that facilitate the analysis of the networks by distributing the nodes within a space according to certain measures. For this study, we made use of the *Event graph layout* plugin (www.wouterspekkink.org/software/#event-graph-layout) to draw bipartite networks and the *Force Atlas 2 layout* included in Gephi to visualize the projected company network.

The visualizations have also been enriched, making the node size proportional to their weighted degree in the original network. That is, the larger the node in the visualization is, the more important it is since either it represents a hashtag posted many times or a company that has posted many hashtags related to the pandemic. The width of an edge, given by the strength of the relation between the two nodes it connects, would be given by the number of times a company has published a hashtag in the bipartite network or the number of shared hashtags by two companies in the company projected network.

4. Results

To study the communication activity of the most sustainable brands in relation to the COVID-19 pandemic, we first analyze the overall posting frequency and the individual frequency of each hashtag group in each wave for both countries. We then focus on the communication strategies of the different companies (i.e. the existing relation between companies and hashtag groups published) on both social media platforms along the pandemic progress, trying to understand the evolution in the behavior of the companies. Finally, we also conduct a general analysis of the whole pandemic period, aiming to extract common and differential patterns in the communication models applied.

4.1 Analysis of the evolution of hashtag frequency and content on the two social media platforms

Due to the discrete nature of hashtags, we must find a way to avoid drawing conclusions that may be affected by noise in the frequency of posts. To avoid noise in the time series of posts, we consider a moving average, as well as the three days before and three days after. With this, we manage to smooth the graph and slightly eliminate the noise.

Figure A.1 in the Online Annex of the manuscript, available at <https://hdl.handle.net/10481/82029>, presents the evolution of the hashtag posting frequencies for the two social networks in both Spain and Italy. The social media platform with the highest number of hashtags related to the COVID-19 pandemic that were published by Spanish companies is Twitter, with a peak of 37 hashtags posted daily in the first wave of the pandemic, as opposed to hashtags on Instagram, where only 15 were posted at the highest point. We observe that Italian companies have been less active in terms of posting hashtags related to COVID-19, obtaining a maximum of four daily hashtags on Twitter and only two on Instagram. In addition, it is important to highlight the fact that the number of hashtags related to the pandemic decreases as it progresses.

Figure A.2 in the Online Annex shows some content analysis information, reporting the evolution of the frequency of each hashtag group in Spain (i.e. of the different messages used in the communication strategies by the companies). As expected, #Covid-19 has been the most used throughout the pandemic, except at the end of the pandemic, where we can see some peaks of the #teletrabajo hashtag group. The first wave generated the most COVID-19-related hashtags, with the most common groups being #Covid-19, #EsteVirusLoParamosUnidos, #QuedateEnCasa, #FrenarLaCurva and #AplausoSanitario.

In the case of the Italian companies, we can also observe how #Covid-19 practically borders the rest of the groups during the whole pandemic (Figure A.3 in the Online Annex). The only exception arises at the end of the pandemic, where we found a similar behavior to the Spanish companies, some small peaks of #telettrabajo and sporadic appearances of other hashtags, without following any kind of trend. Again, we observe a very high increase in hashtags related to the COVID-19, specifically of the groups #Covid-19, #EsteVirusLoParamosUnidos, #QuedateEnCasa and #FrenarLaCurva, in the first wave.

4.2 Global analysis of the evolution of the communication strategies of Spanish and Italian companies on both social media platforms

We now study the evolution of the messages posted by Spanish and Italian companies on both social media platforms. To do so, we aggregate the data scraped from both platforms to integrate the global communication strategy of each company, regardless of the means used to disseminate it. To obtain a clear view of this evolution, the six bipartite company-hashtag networks for each country, each corresponding to a wave, are presented in Figures A.4 and A.5 in the Online Annex. The most important nodes, that is, the most active companies and the most used hashtag groups, are in the center of the visualizations. The size of the nodes and the width of the edges are correlated to the posting frequency. Visualizations are very informative and allow us to quickly obtain an overall view of the situation at each wave period.

Activity and message diversity are reduced with pandemic advancement, showing a progressive lack of engagement by companies in both countries. Thirteen Spanish companies were active at the beginning of the pandemic, while only five were still engaged until the last wave. In Italy, the number decreased from 11 to 3. The use of hashtag groups was reduced from 10 to 3 in Spain and from 6 to 2 in Italy.

The involvement of Spanish companies is higher, with a larger number of active companies in every wave. In addition, their communication strategies are also much more elaborated, showing a larger diversity of hashtag groups and more use over a longer period. For example, we can compare the bipartite networks from the first three waves, which include 10, 7 and 7 hashtag groups in Spain and only 6, 2 and 2 in Italy.

The most engaged Spanish companies are *BBVA*, *Caixabank*, *Mapfre* and *Red Eléctrica*, i.e. two banks, an insurance company, and an electricity provider, which are the only four companies that stayed active during the six COVID-19 waves. Among them, *BBVA* and *Mapfre* are the most active and are always located in the center of the visualizations. We can identify interesting behaviors such as that of *Bankinter*, another bank, which is very active in every wave but the fifth. *Nature Energy Group*, another electricity company, also shows a differential profile, being very active during the first year (the first three waves) and using different groups of hashtags in the first wave (thus, communicating an elaborated message) but ceasing its activity after the third wave.

Focusing on the Italian case, only two companies published in every wave: *Intesa Sanpaolo*, a bank, and *Poste Italiane*, the Italian post service. The former was the most active, but its communication strategy was very basic, using only the generic #Covid-19 hashtag during fifth of the sixth waves. The message contents of *Poste Italiane* are more diverse and adapt at each specific period. It is interesting to see how *Poste Italiane* does not always use the #Covid-19 hashtag as other companies do. Special behaviors can also be identified, as in the Spain case.

4.3 Overall analysis of the companies' communication strategies on both social media platforms

The aim of our last analysis is to study the communication models used on Twitter and Instagram by the brands in the two countries during the whole pandemic period. The

associated single snapshot is represented by the global bipartite company-hashtag network in Figure A.6 in the Online Annex.

The network has 24 company nodes and 11 hashtag group nodes. Hence, the maximum number of edges is 264. It includes 92 edges, with a density of 0.35, a low value. This allows us to conclude that the communication models are not much elaborated (i.e. many companies do not use many different hashtag groups in their communication strategies).

The center of the visualization is occupied by nine Spanish companies, again showing their higher activity. Italian companies are in the periphery, both at the top and the bottom, according to their low activity with respect to the Spanish ones. *BBVA* (bank), *Naturgy Energy Group* (electricity), *Mapfre* (insurance) and *Bankinter* (bank) are the most engaged companies, with weighted degrees of 710, 612, 451 and 280, respectively. They are followed by *Ferrovial* (construction, weighted degree of 178), *Iberdrola* (electricity, 151) and *Red Eléctrica* (electricity, 108). The Italian company with the highest weighted degree is *Intesa Sanpaolo* (bank), with a value of 107, thus, being the 10th company in the global order and showing a large activity difference from the top ones.

The most used group of hashtags is #Covid-19, as it was common in almost all the waves we analyzed previously. It shows a weighted degree of 2,078. One of the particularities of #Covid-19 is that it has been published by all the companies, except for the Italian *Pirelli and C*. The #Covid-19 group is followed by #EsteVirusLoParamosUnidos and #QuedateEnCasa, with a significant difference (weighted degrees of 576 and 342, respectively). All the remaining hashtags show a low level of use with a weighted degree of 100 or less, with #teletrabajo standing out slightly (142).

Figure A.7 in the Online Annex represents the company projection extracted from the bipartite network in Figure A.6. This is a very interesting network because it allows us to extract the relations among the different communication models that were applied by the companies during the pandemic period.

Companies that are linked by thicker edges have published more hashtag groups in common, i.e. they have a higher similarity in the communication strategy. In addition, because of the force layout algorithm used, those companies whose nodes occupy a central position in the visualization are those most central in the complex system. This means they are those having more similarities with the communication strategies of all the remainder, even if those are simpler (composed of fewer hashtags). The companies with a similar strategy and more hashtags published in common were *Naturgy Energy Group*, *CaixaBank*, *Iberdrola* and *BBVA*, since their relations are very strong, and they show a very central position. This is also confirmed by their weighted degrees (103,705, 75,866, 49,444 and 36,933, respectively), which show a significant difference with respect to the next ones: *Mapfre* and *Red Eléctrica* (15,290 and 11,713, respectively).

5. Discussion/conclusion

5.1 Answer to RQ1: "have the most sustainable companies truly been involved in raising societal awareness about COVID-19?"

As we have already analyzed throughout this study, companies became very engaged very quickly on both social media platforms, Twitter and Instagram, when the pandemic started in February 2020. However, this great involvement around COVID-19 quickly disappeared with the passing of the waves, reaching a minimal presence at the end of the sixth wave. With the passage of time, the fatigue of the population and the normalization of the virus, companies reduced their publications about it.

We can also affirm that the Spanish and Italian organizations analyzed have used Twitter more than Instagram to post hashtags related to the COVID-19. This happened

both overall and in every period. This behavior was to be expected since the normal tendency of companies in both countries is to show more activity on Twitter than on Instagram.

5.2 Answer to RQ2: Have Spanish and Italian companies acted in the same way with respect to their communication activity during the COVID-19 pandemic?

Even though Spain and Italy had very similar circumstances during the pandemic, which occurred practically at the same time in both countries, there is a great difference in the number and diversity of hashtags posted, with Spanish companies being more involved in both aspects. We have also observed a higher initial engagement of Spanish companies, which posted a much larger number of hashtags related to COVID-19 than Italian companies did. Spanish companies in general have more presence on social media than Italian ones, so it is normal that they posted more hashtags related to COVID-19.

As seen in the company network in Figure A.7, four Spanish companies from the banking and energy sector dominated the communication during the pandemic on the two social media platforms studied. Thus, they are in the center of the visualization. The Italian companies are in the periphery, and their edges are the finest and, therefore, less representative, thus, representing more testimonial participation.

5.3 Answer to RQ3: Have they followed a solid and continuous communication strategy in social media throughout the pandemic, regardless of the country?

For the messages about the pandemic that the various companies have tried to convey using hashtags, we have been able to see how the hashtag group that was mainly used by all the organizations in almost all the waves was #Covid-19. This was the usual approach used by every company to obtain visibility on social media so that their brand would be associated with being involved during the pandemic.

Leaving aside the #Covid-19 hashtag group, we have seen that at the beginning of the pandemic, companies in both countries wanted to give the message to users to stay at home to avoid infection, thus, reducing the saturation of hospitals. This was done through the hashtag group #QuedateEnCasa. They also sought to thank health-care workers for their effort and dedication during the first wave with #AplausoSanitario. We observed that this hashtag group was used much more often in Spain than in Italy and that it stayed until the last wave analyzed.

In addition, Spanish brands have tried to convey two messages that Italian brands have not given. The first message was intended to provide hope and encouragement to the population, helping them to understand that the pandemic would end and that the day would come when they could leave confinement, and was conveyed through the hashtag group #EsteVirusLoParamosUnidos. The other message was associated with #FrenarLaCurva, seeking to raise awareness among users to be responsible and follow health recommendations so that the curve of new infections would fall and with it the transmission of COVID-19. These two messages given only by Spanish companies were closely linked to the situation of strict confinement experienced in the first wave, when they were mainly used.

Once the first stages of the pandemic were over, the most remarkable fact in terms of messages given by both Spanish and Italian companies was to encourage the population to get vaccinated through the hashtag #vacunacovid19 once the countries began vaccination campaigns.

Regarding the differences in message diversity in the communication model followed, we can state that it has been much more diverse in terms of hashtag groups in Spanish companies. They posted a total of 11 hashtag groups, while Italian companies published only approximately 7 groups. In addition, the messages of the Spanish brands have been more elaborated as more companies have jointly used different hashtag groups in different periods. This conclusion is reinforced by the company network in Figure A.7 in the Online Annex. The Spanish brands occupy the center of the visualization, showing greater activity and higher similarity in the communication strategies. In contrast, the Italian companies are located on the periphery, showing that they only use a few groups of hashtags compared to the more elaborated messages from Spanish companies and that they have made fewer publications (and, therefore, the edges are weaker).

5.4 Answer to RQ4: Have they constructed a different message depending on the social media used?

The difference in diversity between Twitter and Instagram is practically negligible from a global viewpoint, as the hashtags from all 11 groups have been published on both platforms. Therefore, we highlight that the difference in diversity in terms of the number of hashtags is given by the companies in both countries and not by the social media platform used. Nevertheless, when analyzing the bipartite networks shown in Figures A.8 and A.9 in the Online Annex, corresponding to the publications made by every company on each social media platform during the six waves, we can draw some additional conclusions.

We can see that in the first wave, companies were very active on both Twitter and Instagram, using 10 hashtag groups, and the number of companies using both social media platforms was similar (23 on Twitter and 19 on Instagram). Nevertheless, as the waves progressed, the number of hashtag groups as well as companies decreased significantly in the case of Instagram, until literally disappearing in the fifth wave (Figure A.9 in the Online Annex). There may be a few reasons for this behavior. First, Twitter has a higher user profile that can follow these companies and feel connected with the message to be transmitted, so it could be preferable for companies early on. In addition, Instagram has younger users who had other concerns and no interest in being a follower of any of the companies considered, and, therefore, these companies could have progressively abandoned communication and awareness through this platform for this reason.

5.5 Answer to RQ5: is it necessary to conduct an in-depth study for companies that aim to be sustainable in regard to their communication with society in future pandemics, which will need to include appropriate language and permeate the population?

An unexpected new scenario such as that of the COVID-19 pandemic involves the emergence of new interaction patterns between companies and citizens where sustainable companies can increase citizenship awareness via social media. For this reason, our objectives with this study were to analyze how the posts of the different companies had evolved throughout the COVID-19 pandemic and to study the messages they wanted to convey through the hashtags that they published in the different waves. This would allow us to study the involvement of private organizations during COVID-19 and to analyze how this involvement has evolved.

We can conclude that although the important health communication role played by institutions in social networks during this crisis has been clearly identified, this phenomenon seems to be temporary (Ferrer Serrano *et al.*, 2020). In this sense,

Pourebrahim *et al.* (2019) show how in an initial phase of a critical situation such as COVID-19, the rate of users grows, but once this period is over, engagement with the population is lost. It has been observed in our experimental study that the interest of the most sustainable Spanish and Italian companies in promoting awareness about COVID-19 reduced with the advance of the pandemic since the number of publications, the variety of hashtags and the percentage of posts devoted to the issue decreased with time.

Therefore, the design of a detailed list of guidelines showing sustainable companies how to effectively communicate in future pandemics remains an actual need. Regardless of the hopeful near end of the COVID-19 pandemic, even if it has not already finished at the global level, our opinion is that the research topic remains timely and of great interest. On the one hand, it is unfortunate to say that pandemics have become more frequent and occur in shorter time periods in recent years. On the other hand, the interest of companies to include health communication in their corporate social activity on social media continues to be an important issue in the area of marketing.

6. Limitations and future research

This research provides particularly relevant insights about the communication strategies followed by the main sustainable companies in Spain and Italy during the COVID-19 pandemic on social media. The main limitation is that we have focused only on companies that are recognized as sustainable in both countries. Focusing only on these companies has allowed us to obtain a closer look at their commitment to CSR, but other companies that play an important role in society and are more highly valued by citizens can also be incorporated for future research. Analyzing only these two countries constitutes another limitation. Although there is a reason for this approach, given the almost parallel start of the pandemic in time, another future research project would be to consider the European countries most affected by the pandemic and the engagement of their main companies in social networks.

We should also mention that we have been able to identify these communication models, discovering similarities and differences among them, as well as their evolution through time, but our study does not evaluate the effectiveness in society of the disseminated messages regarding raising awareness about the pandemic. To do so, it would have been necessary to know the feelings expressed by the Spanish and Italian citizens in response to the messages provided by the sustainable companies. Santoveña-Casal *et al.* (2021) explored the feelings associated with the hashtag #EsteVirusLoParamosUnidos in Spain using other kinds of discourse analysis methods to examine the associated tweets. This approach can be a very interesting option for future work to complement the current study.

Notes

1. The interested reader can refer to a preliminary study corresponding to the situation in the first wave of the pandemic in (Zarco and Córdón, 2020).
2. <https://es.statista.com/estadisticas/1106989/actividades-de-entretenimiento-durante-el-aislamiento-por-el-covid-19-espana/?locale=es>
3. www.statista.com/statistics/1112071/time-spent-on-youtube-during-the-coronavirus-lockdown-in-italy/
4. www.statista.com/statistics/1106498/home-media-consumption-coronavirus-worldwide-by-country/

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