

Analysis of universities' integrated communication strategies on *Twitter-X*

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Abstract

This study offers a comprehensive approach to the evaluation of communication strategy in social networks, which contributes to the academic field by means of a specific analysis methodology, while guiding professionals in their management of digital communication. The key dimensions of universities' general communication strategy (posting, interactivity and content strategies) on *Twitter* (now *X*) are evaluated in a holistic and integrated manner. The level of interaction that universities achieve through their various strategies is also ascertained. To do so, 70 universities (25 from Europe, 20 from the United States, and 25 from Latin America) present in one of the three most prestigious international rankings were selected. A content analysis of 53,446 posts was carried out of their official institutional profiles on *Twitter*, applying a specific methodology to study the Posting Strategy (through two dimensions: level of Activity and type of Presence), the Interactivity Strategy (with 2 dimensions: level of Resources and level of General approach), and the Content Strategy (with 2 dimensions: Relevance of topics and level of Combination). Our data reveal that the communication strategies of the universities studied are within the recommendations made by experts and achieve fairly good interaction with users, in accordance with studies carried out in other sectors. Some variations are noted between regions, with Latin America being more active than Europe and the United States, also obtaining higher levels of engagement with their users. The combined results show that the integrated strategy with the highest interaction requires a low frequency of posts with an adequate degree of interactivity, but with a high dose of creativity in content creation.

Keywords

Universities; Higher education institutions; Institutional communication; Digital communication; Social networks; *Twitter*; Integrated communication strategy; Posting; Interactivity; Content; *X*.

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1. Introduction

The digital era brought with it opportunities for university institutional communication since it helps achieve a more dynamic and open organization where the whole of society (in general) and academic agents (in particular) collaborate and participate in the production, development, dissemination and consumption of scientific knowledge (Alonso-Flores *et al.*, 2020; Salsé-Rovira; Jornet; Guallar, 2021).

Several studies point out that social networks have become essential tools for the strategic management of universities' institutional communication (Kimmons; Veletsianos; Woodward, 2017; Eger *et al.*, 2020). Universities should therefore take advantage of digital platforms to organize their public participation through dialogue with their publics (Marino; Lo-Presti, 2018).

The university sector must develop strategies in the digital field that promote good institutional visibility, as well as dialogue and interaction with its publics, thus collaborating to achieve its organizational goals (Zerfass *et al.*, 2021).

Among the social networks available for the development of a digital communication strategy, *Twitter* (now called *X*) deserves to be highlighted. It is the second most referral traffic-generating social network globally (Statcounter, 2023), allowing users to share content from other users to exchange ideas and encourage active participation in conversations. As for the number of monthly active users worldwide, there are some divergences: some studies establish around 350 million (Statista, 2023) and others around 550 million (Kemp, 2023). In relation to this social network, it is necessary to make a general contextualization of the change that has occurred since October 2022, when Elon Musk acquired it. In July 2023, it underwent an important naming change, changing its name to *X*. In addition, since the acquisition, it has undergone substantial changes in its structure and strategy, promoting an increase in the dissemination of text, video, messaging and other services. All this entails significant changes not only in the activity and dissemination of information by organizations but also in the engagement of their users. In this study, we will keep the name "*Twitter*", since the data collection (and therefore the results) are before the acquisition and the changes in the platform. This social network provides universities with the ability to disseminate their key messages, promote discussions on education, research and social issues with the academic community, and actively participate in broader conversations on current issues in real-time. Through hashtags, retweets, and mentions, universities can extend their reach and foster meaningful engagement with their community (Kimmons; Veletsianos; Woodward, 2017).

Various studies have investigated the different dimensions of university communication on social networks, but no research has been conducted to analyse them in an integrated manner. Individual studies have been conducted into universities' presence on platforms (Peruta; Shields, 2016; Brech *et al.* 2017), their level of activity (Brech *et al.*, 2017; Kimmons; Veletsianos; Woodward, 2017; Ebrahim; Seo, 2019; Eger *et al.*, 2020), the application of general approaches (Kimmons; Veletsianos; Woodward, 2017), the use of communication resources (Cancelo-Sanmartín; Almansa-Martínez, 2013; Peruta; Shields, 2016; Brech *et al.*, 2017; Ebrahim; Seo, 2019), and the content disseminated (Marino; Lo-Presti, 2018; Ebrahim; Seo, 2019; Fährnich; Vogelgesang; Scharkow, 2020).

The main objective of this study is to analyse, in an integrated manner, the key dimensions of universities' communication strategies on *Twitter* (in Europe, the United States and Latin America), and to evaluate the level of interaction achieved by universities through their various strategies. This will enable enriching academic studies, gaining further knowledge of the strategic management of social networks and integrating the dimensions in a holistic analysis (as they have generally been studied separately). It will also contribute towards helping professionals to optimize their communication management on social networks. This will allow higher education institutions to improve their digital communication through strategies that encourage interaction with their users on social media.

2. Theoretical framework

Digital communication became an important instrument for relations and communicative exchanges between universities and their publics (Ebrahim; Seo, 2019), since it allows them to give greater visibility to their institutional initiatives (Marino; Lo-Presti, 2018; Salsé-Rovira; Jornet; Guallar, 2021) and contributes to promoting their public participation through dialogue with their publics (Marino; Lo-Presti, 2018; Fährnich; Vogelgesang; Scharkow, 2020; Gori *et al.*, 2020).

Social networks have gained prominence in digital communication strategy over the last 15 years and are increasingly integrated into strategic public relations and communication programmes (Johann; Wolf; Godulla, 2021; Zerfass *et al.*, 2021). Some authors (Johann; Wolf; Godulla, 2021; Albanna; Alalwan; Al-Emran, 2022) assert that there is no longer any debate around the inclusion of social media as communication tools, but around how they should be strategically managed to interact and create long-term relations with publics in the digital environment. Some studies show that the constant use of social networks is key to improving the effectiveness of communication departments (Zerfass *et al.*, 2021).

“ Institutional communication management in social media is characterised by three pivotal dimensions: strategic publication planning, meticulously crafted interactivity, and the formulation of strategic content ”

The integrated management of key aspects of social media is critical for achieving communication goals. Thus, the management of institutional communication in social networks would comprise three major key dimensions: posting strategy (Capriotti; Oliveira; Carretón, 2023), interactivity strategy (Capriotti; Zeler, 2023), and content strategy (Capriotti; Losada-Díaz; Martínez-Gras, 2023). These three dimensions are very closely related and influence each other. Therefore, studying all these aspects holistically (posting, interactivity and content) is crucial for organizations to develop appropriate strategies to inform and interact with their publics.

2.1. Universities' posting strategy on social networks

An active presence on social networks is essential for institutions to become a source of information for all those interested in university matters (Kimmons; Veletsianos; Woodward, 2017; Marino; Lo-Presti, 2018; Fähnrich; Vogelgesang; Scharkow, 2020).

The social media Posting Strategy refers to maintaining constant visibility in social media that allows disseminating important information about the organization, and facilitates and promotes communicative exchanges between the organization and users in social networks (Peruta; Shields, 2016; Capriotti; Zeler; Oliveira, 2021). Universities can foster an active social media presence by duly managing two key elements of their posting strategy: the Activity carried out and the Presence adopted on each platform (Capriotti; Oliveira; Carretón, 2023)

On the one hand, Activity refers to the active and continuous use of social networks to promote the dissemination of information and interaction between an organization and its users (Brech *et al.*, 2017; Eger *et al.*, 2020; Capriotti; Zeler; Oliveira, 2021). To analyse organizations' activity, the volume of posts and the average frequency with which they are disseminated require consideration (Capriotti; Zeler; Oliveira, 2021). Some studies (Capriotti; Zeler; Oliveira, 2021) reveal great disparity regarding organizations' appropriate level of activity of on social networks. Such disparity in the results is due to the type of entities analysed, the origin of the study, and the social networks studied. In recent years, studies on universities' level of digital activity have concluded that their posting frequency is rather low (Gori *et al.*, 2020)..

On the other hand, Presence involves having an institutional profile on the chosen social networks and determining the type of presence sought to be promoted on them, for the institution to create a public identity of its own to disseminate its contents (Cho; Furey; Mohr, 2016). To achieve adequate presence, it is important to determine the type of presence sought to be promoted on each of them. In this respect, there are three different types of social media presence according to the types of posts (tweets, in the case of *Twitter*) (Capriotti; Oliveira; Carretón, 2023): An organization's *proprietary* posts, where it creates and disseminates its own content on its profiles; *shared* posts, where it shares the content of other users on its profiles without adding any additional information or personalized content; and *hybrid* posts, where it shares the content of other users on its profiles, with the addition of information or personalized content. Various authors have studied universities' digital presence in social networks (Guzmán-Duque; Del-Moral, 2013; Peruta; Shields, 2016; Brech *et al.*, 2017), concluding that universities proactively use digital platforms mainly to present their own content.

2.2. Universities' interactivity strategy on social networks

Social media provide a suitable channel to foster interaction and bidirectional communication between organizations and their publics online (Kent; Taylor, 1998; Huang; Yang, 2015; Johann; Wolf; Godulla, 2021). However, being present on social networks does not directly involve interaction between organizations and their users. Theunissen and Wan-Noordin (2012) argue that successful organizations design appropriate dialogic environments that facilitate stakeholder engagement.

Organizations employ the interactivity strategy to foster the development of an active relationship with their publics (Capriotti; Zeler; Oliveira, 2021). The social media Interactivity Strategy refers to organizations' predisposition to interact with their publics, encouraging one-way dissemination or a dialogic exchange of information by applying a particular communicative approach to their posts and the use of specific digital resources that promote (or not) reciprocal communication (Capriotti; Zeler, 2023). Universities' interactivity strategy on social networks includes two fundamental dimensions: the general communication approach that is defined for the posts, and the communication resources that are used in each of them.

The general communication approach refers to the general way of preparing and expressing the content disseminated on social networks, based on the inclusion (or not) of textual or visual elements that enhance one-way dissemination or promote interaction with publics (Capriotti; Zeler, 2023). There are two main general approaches: informational and conversational (Capriotti; Zeler; Oliveira, 2021). The *informational approach* refers to mainly one-way, expositive posts where the level of interaction is low. It is designed to disseminate information to influence the reputation of the entities in the eyes of their publics. The *conversational approach* refers to markedly bidirectional posts, where the degree of interactivity is high. It is designed to establish and build relations by enabling

“ The Posting Strategy spans from low shared activity (‘Passive Hub’) to high proprietary activity (‘Active Funnel’), revealing the diverse approaches adopted by universities in their social media presence ”

dialogue and interaction between the organization and its publics. Some authors (Eger *et al.*, 2020; Fährnich; Vogelgesang; Scharkow, 2020) assert that universities' content that stimulates interaction with users is content that achieves the most effective relations on social networks. Some studies suggest that there are differences in the communication approach adopted by higher education institutions: while some research reveals that institutions have a purely informative approach (Kimmons; Veletsianos; Woodward, 2017), others applied to Ibero-American universities show a predominance of a more interactive approach (Guzmán-Duque; Del-Moral, 2013).

“ The Interactivity Strategy, ranging from a ‘monologic’ approach with informational and expository resources to a ‘dialogic’ approach with conversational and interactive resources, reflects the nuanced dynamics of social media institutional communication ”

Communication resources are a variety of (textual, graphic, audiovisual and interactive) elements with which the content disseminated on social networks is prepared (Stsiampkouskaya *et al.*, 2021). By combining various resources, organizations can improve the transmission of information and connect more effectively with users on social media. Two general types of communication resources have been detected (Capriotti; Zeler; Oliveira, 2021). *Expository resources* are fundamentally unidirectional and facilitate the actual dissemination of information (such as texts, images, emojis, video, audio, GIFs, etc.). *Interactive resources* are primarily bidirectional and encourage information exchange and user engagement (such as links, hashtags, tags, questionnaires, events, etc.). The results of several pieces of research in universities (Peruta; Shields, 2016; Brech *et al.*, 2017; Ebrahim; Seo, 2019) show that expository resources (mainly textual and graphic) are far more widely used than interactive resources. Thus, these institutions are not taking advantage of the resources available in digital communication efficiently to generate dialogue with their publics.

2.3. Universities' content strategy on social networks

Social networks are ideal channels for universities to disseminate their different activities among their publics quickly, easily and internationally (Peruta; Shields, 2016; Fährnich; Vogelgesang; Scharkow, 2020).

In this way, Content Strategy on social networks focuses on selecting, prioritizing and combining the various types of content related to the entity's activities (Fährnich; Vogelgesang; Scharkow, 2020). Organizations must decide on two basic issues: key contents (the choice of the most relevant topics) and the combination of contents (which have the highest priority, presence or visibility) on their social networks. With regard to universities' key contents, five central global content types have been identified (Oliveira; Capriotti; Zeler, 2022; Capriotti; Losada-Díaz; Martínez-Gras, 2023): *Teaching* (on academic life, teaching activity, etc.), *Research* (on the university's research activity), *Social commitment* (on the institutional “third mission”, its social engagement, etc.), *Organizational* (information concerning its running and management for institutional transparency), and *Context* (social, economic, cultural etc. issues of the general environment). In addition to studying the type of content organizations offer their publics, social media content management analysis must also assess how information is organized and combined over time. The combination of contents refers to the way in which the various topics disseminated by universities relate to other topics. The key contents and their level of combination will contribute to determining the communicative positioning of the institution and will promote a certain reputation among its publics (Sataoen; Waeraas, 2016; Rutter; Lettice; Nadeau, 2017; Marino; Lo-Presti, 2018; Salsé-Rovira; Jornet; Guallar, 2021).

2.4. From dissemination to interaction on social networks

Effective communication exchanges on social networks comprise a set of interactions between organizations and their users (likes, shares and comments), which are generally known as “*engagement*” on social networks (Fährnich; Vogelgesang; Scharkow, 2020). *Likes* on social networks would indicate users' reaction to the posted content; “*shares*” (*retweets* in the case of *Twitter*) show the virality of the content on social networks; and “*comments*” (*replies* in the case of *Twitter*) tend more clearly to reflect the conversation on social networks between users and entities (Anderson; Swenson; Gilkerson, 2016; Abitbol; Lee, 2017). The combination of these three forms of engagement represents an institution's General Engagement on its social networks (Voorveld *et al.*, 2018).

Interaction (likes, shares and comments) in the field of universities on social networks has been investigated by various studies (Guzmán-Duque; Del-Moral, 2013; Peruta; Shields, 2016; Abitbol; Lee, 2017; Simancas-González; García-López, 2017; Eger *et al.*, 2020; Fährnich; Vogelgesang; Scharkow, 2020; Gori *et al.*, 2020) through the analysis of the *rate of engagement*. However, studies suggest that greater activity leads to a greater possibility of interaction (Guzmán-Duque; Del-Moral, 2013; Peruta; Shields, 2016; Simancas-González; García-López, 2017; Fährnich; Vogelgesang; Scharkow, 2020). Thus, the results point to a significant positive relationship between the interactivity implemented and users' attitude and behaviour on digital platforms (Eger *et al.*, 2020). Finally, the data reveal that topics related to teaching, research and social commitment generate greater interaction than topics related to institutional and contextual issues (Eger *et al.*, 2020; Fährnich; Vogelgesang; Scharkow, 2020; Gori *et al.*, 2020).

3. Methodology

To achieve the general goals established, the following research questions were posed:

RQ1: What Posting Strategy do universities adopt on *Twitter*?

RQ1a: What Level of Engagement do such strategies generate?

RQ2: What Interactivity Strategy do universities adopt on *Twitter*?

RQ2a: What Level of Engagement do such strategies generate?

RQ3: What Content Strategy do universities adopt on *Twitter*?

RQ3a: What Level of Engagement do such strategies generate?

RQ4: What type of Integrated Strategy of communication (post + interactivity + content) do universities implement on *Twitter*?

RQ4a: What Level of Engagement do such strategies generate?

3.1. Sample and analysis unit

The communication strategy of 70 higher education institutions on *Twitter* was analysed. To select the universities, the presence and position of the universities in one of the three most prestigious international rankings in 2020 (last year available before systematic data collection) were taken as the main criteria: *ARWU Ranking of World Universities*; *The Times Higher Education Rankings* and *QS World University Rankings*. To achieve the greatest representation of universities, three major geographical areas were defined: Europe (as it is a direct benchmark on an international level), the United States (taken as an area in itself, due to the number and importance of its universities in the rankings and its geographical dimension), and Latin America (due to the high degree of university development in the region). Thus, the universities of the United States and Europe selected were among the top 100 institutions in these rankings. The Latin American universities, not present in the top 100 positions, were chosen based on their general position in the global rankings and by regions. In the case of Latin America and Europe, priority was given to geographical diversity, in order to achieve greater representativeness of the different countries. Based on all the above, the final study sample consisted of 70 universities: 20 from the United States, 25 from Europe, and 25 from Latin America (Appendix 1).

The unit of analysis is posts by universities in their official institutional accounts within the established time periods. The official institutional account of each university was identified. All profiles that could not be located or verified by the institutions themselves were discarded. Once the universities' official accounts were identified, all tweets were systematically recorded in two periods of full academic activity. To avoid biases in the collection of information and to prevent the analysis from being influenced by a specific situation or action, the publications observed were collected, taking into account two periods of full academic activity as a time frame. Three months were selected in the first semester, from March 15 to June 14 (13 weeks, 91 days) and three months in the second semester, from September 15 to December 14 (13 weeks, 92 days). In total, 26 weeks and 183 days. The study sample comprised all posts, both proprietary and shared, that the selected universities conducted in their official institutional *Twitter* accounts during the time period described (53,446 tweets). All tweets were collected, which enabled obtaining reliable data on the volume and intensity of universities' communication activity.

3.2. Method and analysis categories

To work on the established research questions, the method of content analysis of the posts made by the universities on their official institutional *Twitter* profiles was chosen, since it allows analysing, interpreting and exploiting the systematized data to make both quantitative and qualitative inferences (Gheyle; Thomas, 2017). Three categories of analysis related to strategies were established: "posting strategy", "interactivity strategy" and "content strategy". Based on the combination of these three categories, a fourth category was designed called "integrated communication strategy on social networks". A fifth category was also designed, for "Engagement". These categories had already been developed and tested in previous studies, on an individual basis (Capriotti; Losada-Díaz; Martínez-Gras, 2023; Capriotti; Oliveira; Carretón, 2023).

To study the Posting Strategy (RQ1), two scales were designed ("Level of Activity" and "Type of Presence") assigning a weighted value to institutions' Presence and Activity on social networks.

- *Level of Activity (LoAC)* allows analysing the frequency of posts on *Twitter* (Capriotti; Oliveira; Carretón, 2023). A scale was defined based on the mean daily number of tweets disseminated, awarding 1 to 5 points, from a "very low activity" to a "very high activity", taking the appropriate frequency of *Twitter* posts recommended by various studies (between three and five tweets/day) as a reference) (Capriotti; Zeler; Oliveira, 2021; Zeler; Capriotti; Oliveira, 2023) (Appendix 2).
- *Type of Presence (ToPE)* helps to evaluate the types of tweets (proprietary, shared or hybrid) that institutions post on their *Twitter* profile (Capriotti; Oliveira; Carretón, 2023), assigning values for each type of post, between 1 and 2 points, where 1="Shared"; 1,5="Hybrid" and 2="Proprietary". Thus, a scale has been defined based on the combination of the different types of tweets, from "high shared presence" (Hub) to "high proprietary presence" (Funnel)

(Appendix 2).

The combination of these two scales (LoAC and ToPE) will facilitate the development of a matrix to position the different institutions and will make visible the Posting Strategy implemented by the universities on *Twitter*, from low shared activity (“Passive Hub”) to high proprietary activity (“Active Funnel”) (Appendix 2).

To establish the Interactivity Strategy (RQ2), two scales were built (“Level of General Approach” and “Level of Resources”), assigning a weighted value to the General Approach and the Resources applied in their tweets.

- The *Level of General Approach (LoGA)* analyses the general communication approach implemented by institutions on their profiles (**Capriotti; Zeler, 2023**), based on the identification of textual or visual elements that, to a greater or lesser extent, foster the dissemination of information or interaction with users. To do so, a nominal measurement variable was generated with two categories (1=informational; 2=conversational). A scale was established that weights the values from “highly informative” to “highly conversational”, based on the score assigned to the different types of tweets (Appendix 3).
- The *Level of Resources (LoRE)* examines the tools available in tweets that enable promoting the dissemination of information or interaction with users (**Capriotti; Zeler, 2023**). An ordinal measurement variable was constructed with a five-degree scale (1=highly expositive; 5=highly interactive), which measures the set of resources used based on the attributed weights (0= contains no resources; 1=contains resources) in each of the dimensions included (Text, Graphic, Audiovisual, Referential, Hypertextual and Participatory) (Appendix 3).

The combination of the two scales (LoGA and LoRE) will yield a matrix that positions the different institutions and makes visible the Interactivity Strategy implemented, from a “monologic” strategy (informational approach and expositive resources) to a “dialogic” strategy (conversational approach and interactive resources) (Appendix 3).

To analyse the Content Strategy (RQ3), two scales were constructed (“Relevance of Topics” and “Level of Combination”), assigning a weighted value to the Relevance and the Combination of the topics (Institutional, Teaching, Research, Social Commitment and Contextual) that the institutions disseminated on their *Twitter* accounts.

- The *Relevance of Topics (RoTO)* analyses the importance assigned to each topic (**Capriotti; Losada-Díaz; Martínez-Gras, 2023**). A scale was designed based on the percentage of posts of each type of content over the total number of posts, which allows establishing the degree of relevance of each topic: from “very low” to “very high”. In this way, topics with medium or higher relevance can be considered “key topics”, to varying degrees (Appendix 4).
- The *Level of Combination (LoCO)* sets out how different contents are combined in a certain period of time (**Capriotti; Losada-Díaz; Martínez-Gras, 2023**). A scale was developed based on the combination of the different types of disseminated content: from a “low combination” to a “high combination” (Appendix 4).

Integrating these two aspects (RoTO and LoCO) will allow defining the universities’ Content Strategy, whose orientation will be marked by the most relevant key topics. The combination of the five specific contents defined (institutional, teaching, research, social commitment and context), allow defining four main strategies: Balanced, Combined, Dominant, and Exclusive (Appendix 4).

To define the Integrated Strategy of communication on social networks (RQ4), a matrix was designed that relates posting and interactivity strategies, establishing four global strategies: “Passive Monologic” (with passive posting and monologic interactivity); “Active Monologic” (with active posting and monologic interactivity); “Passive Dialogic” (with passive posting and dialogic interactivity), and “Active Dialogic” (with active posting and dialogic interactivity). Each of them is complemented by one of the four content strategies defined (balanced, combined, dominant, and exclusive). This matrix allows determining the integrated communication strategy in social networks and positioning each of the universities according to their own combination of the three strategies (Appendix 5).

To study the Level of Engagement (RQ1a to RQ4a), the total set of interactions (likes, retweets and replies) obtained by the universities was analysed, and it was related to the number of tweets posted and the volume of followers. Thus, four standardized indicators (rates of engagement) were built that will allow evaluating the engagement of posts: *reaction rate* (RR), *viralization rate* (VR), *conversation rate* (CR), and *general engagement rate* (GER) (**Voorveld et al., 2018; Capriotti; Zeler; Oliveira, 2021**). They were measured as set out below:

- Reaction Rate (RR): Total number of “likes” divided by the total number of posts; divided by the number of followers; and multiplied by 1000.
- Viralization Rate (VR): Total number of “retweets” divided by the total number of posts; divided by the number of followers; and multiplied by 1000.
- Conversation Rate (CR): Total number of “replies” divided by the total number of posts; divided by the number of followers; and multiplied by 1000.
- *General Engagement Rate* (GER): the sum of the three previous rates.

Some studies point out that the *recommended* (or adequate) Engagement Level on *Twitter* (**Adobe, 2022; Feehan, 2022; Martínez, 2022**) should be equal to or greater than 0.5%. However, according to several studies in various sectors with different types of organizations, the engagement level *achieved* on *Twitter* is considerably lower than recommended:

between 0.04% and 0.07% (Adobe, 2022; Feehan, 2022; Martínez, 2022). Thus, based on the appropriate engagement rate recommended by the experts and the levels of engagement obtained by the organizations in various studies of different sectors of activity, a scale was defined to establish the Engagement Level achieved by universities on *Twitter*: from “very high” to “very low” (Appendix 6).

3.3. Data collection and processing

Information was collected and processed via the platform and mass data and information collection and management system of the company *Noticias Perú*:

<https://www.noticiasperu.pe>

As indicated in the introduction, the collection of the units of analysis was conducted prior to the acquisition and the strategic changes we implemented in the social network. To do so, two work teams were set up: one team of three people (one supervisor and two technicians) to search for and retrieve posts (tweets), and another team of three people (one supervisor and two analysts) for systematic data extraction.

To evaluate the reliability of the method used, the two analysts carried out a test on a sample of 300 posts using a random procedure. This sample is highly satisfactory for evaluating agreement and reliability between two analysts (Lombard; Snyder-Duch; Bracken, 2002). Using 2x2 contingency tables as a basis for their statistical analysis and with a 95% confidence interval, the percentage calculation of agreement between the two analysts is established. Cohen's Kappa coefficient (k) is also calculated to assess the reliability of the categorical variables. To interpret their results, the measurement ranges proposed by Landis and Koch are applied (1977). For the interpretation of the results of the level of agreement, equivalent percentages are applied. For “Presence”, 99% agreement was obtained (k=.99), for “Activity”, 97% (k=.96), for “General Approach”, 91% (k=.82), for “Resources”, 96% (k=.93), and for “Content”, 91% (k=.83), demonstrating a substantial agreement in the criteria of the tool, hence it may be concluded that the measurement is valid.

The data were initially recorded in an Excel template, and then coded and inputted into the *IBM SPSS Statistics 25* program for subsequent analysis and statistical processing by the research team. To confirm the results and analyse significant differences and associations between regions, non-parametric statistical tests were implemented. In the case of contrast of means and ranges, the Mann-Whitney U test and the Kruskal-Wallis H test were chosen. A bivariate correlation analysis (Spearman's Rho) was used for the correlations. For the correspondence analysis, Anova multivariate factor analysis was applied. For posting strategy (presence and activity), a Chi-Square test and Cramer's V symmetric measure were performed; this was followed by a simple correspondence analysis and a multiple correspondence analysis with optimal scaling. For the interactivity strategy (approach and resources), a bivariate correlation analysis (Spearman's Rho) was performed, followed by a two-way Anova. For content strategy (key topics), a one-factor Anova analysis was performed.

4. Results

53,446 tweets were collected on *Twitter* during the period analysed. The number differs depending on the regions: Latin America (43.5%), the United States (33%) and Europe (23.4%).

In all, 2,229,354 interactions were achieved. The “reaction” (likes) is the main interaction generated by the universities' tweets, accounting for 77.4%, followed at a great distance by “viralization” (retweets) (20.6%), and “conversation” (replies) (1.9%) (Table 1).

Table 1. Volume of posts and interactions by regions

	EUR		USA		LAT		Total	
	N	%	N	%	N	%	N	%
Tweets	12,516	23.4	17,663	33.0	23,267	43.5	53,446	100
Reaction (Likes)	312,748	18.1	634,747	36.8	778,783	45.1	1,726,278	77.4
Viralization (Shares)	88,613	19.3	126,719	27.6	244,608	53.2	459,940	20.6
Conversation (Comments)	10,450	24.2	15,605	36.2	17,081	39.6	43,136	1.9
General Engagement	411,811	18.5	777,071	34.9	1,040,472	46.7	2,229,354	100

The general engagement rate (GER) of all universities reaches 0.476, and is slightly below the adequate values recommended by the experts, but well above the averages observed in various sectoral studies (Adobe, 2022; Feehan, 2022; Martínez, 2022). Thus, it can be considered that, generally speaking, the universities have a medium-high level of engagement. Latin America has the highest volume of posts, but its engagement rate is quite similar to that of Europe, which has almost half the tweets. The

Results showcase a widespread and integrated use of expositional and interactive resources, with notable differences observed among resource types in different regions

United States has a good number of posts, but its engagement rate is by far the lowest of all regions (Table 2)

Table 2. Interaction rates by regions

Region	Tweets (no.)	RR rate	VR rate	CR rate	GER rate
EUR	12,516	0.411	0.113	0.016	0.540
USA	17,663	0.160	0.033	0.004	0.197
LAT	23,267	0.483	0.143	0.010	0.636
General	53,446	0.365	0.101	0.010	0.476

4.1. Posting and engagement strategy (RQ1 and RQ1a)

In terms of Activity, the mean on *Twitter* (4.17 tweets/day) is within the values recommended by the experts (between three and five tweets/day). Latin America (5.09) and the United States (4.83) have a good level of activity (within the mean), while Europe has a low level, below the mean recommended by the experts (2.73) (Table 3).

In relation to Presence, there is a clear majority of proprietary tweets (70%) on the profiles of the universities, and shared or hybrid tweets account for around 30% of the total. European universities stand out for a balance between proprietary (57.2%) and shared/hybrid (42.8%) posts. US universities prioritize proprietary (63.4%) over shared/hybrid posts (36.7%), and Latin American universities make greater use of proprietary posts (82.6%) compared to shared/hybrid content (17.4%) (Table 3).

Table 3. Posting strategy by regions

Region	Activity		Presence (%)		
	Tweets	\bar{x} tweets/day	Proprietary	Hybrid	Shared
Europe	12,516	2.73	57.2	3.8	39.0
United States	17,663	4.83	63.4	2.4	34.3
Latin America	23,267	5.09	82.6	2.2	15.2
Total	53,446	4.17	70.3	2.6	27.1

In relation to Posting Strategy (Table 4), it can be seen that *Level of Activity* (LoAC) is medium-low (2.47), with European institutions being less active (rather passive) than entities in the United States and Latin America (with somewhat passive activity). In relation to *Type of Presence* (ToPE), proprietary content predominates over hybrid and shared content (3.90), with Europe and the United States presenting a higher level of combination of proprietary and shared posts, while Latin America presents a marked orientation towards proprietary content. Thus, universities in all regions have a mainly “funnel”-type presence, and above all those in Latin America.

Table 4. Posting strategy by regions

Region	LoAC	ToPE	Posting Strategy
Europe	1.98	3.73	Passive Funnel
United States	2.72	3.69	Passive Funnel
Latin America	2.77	4.25	Passive Funnel
General	2.47	3.90	Passive Funnel

Thus, the overall results on *Twitter* (Table 4) suggest that the posting strategy in all regions is “passive funnel”-type (low volume of activity, with mainly proprietary tweets). Universities in Europe and the United States have mostly proprietary posts (with a reasonable degree of hybridization), although European universities have a much lower level of activity. For their part, the volume of activity of Latin American institutions is similar to that of the United States, but with mostly proprietary tweets.

Although a general posting strategy can be identified by regions, the scattering matrix (by universities) displays a wide variety of strategies (Figure 1). The majority strategy is “passive funnel”-type (60% of entities), followed by the “active funnel” strategy (27%) and, to a much lesser extent, “passive hub” and “active hub” strategies (both with less than 10%) (Table 5).

Regarding the Engagement Level generated by the different

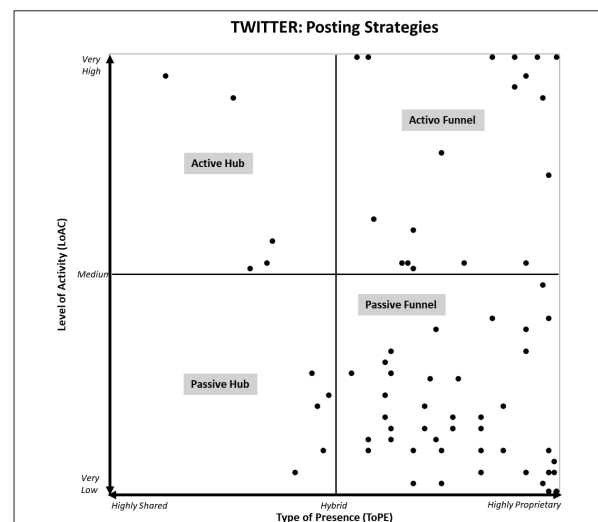


Figure 1. Scattering matrix. Posting strategy by universities

posting strategies, it can be seen (Table 5) that they have a medium level of interaction, with results below the level recommended by the experts (except Latin America) but well above that achieved in various sectoral studies.

Table 5. Posting strategies and engagement

Type	Strategy		Engagement	
	No.	%	GER	Level
Active Hub	5	7.1	0.139	Medium
Active Funnel	19	27.1	0.215	Medium
Passive Hub	4	5.8	0.166	Medium
Passive Funnel	42	60.0	0.664	High
General	70	100	0.476	Medium

It is observed that “passive” strategies obtain somewhat more interaction, and notably, the “passive funnel” strategy achieves a high level of engagement, tripling the interaction achieved in relation to the other strategies. Thus, the strategies with a low level of activity (passive) and with marked use of proprietary content (funnel) are the ones that obtain better engagement results, mainly at high and very high levels of interaction (Figure 2).

4.2. Interactivity strategies and engagement (RQ2 and RQ2a)

Regarding the General Approach, the universities opt for a marked informational approach (92.7%) in their *Twitter* posts. This is also evident in all the regions analysed, although in Latin America there is a higher percentage of conversational approach (Table 6).

Concerning Resources, 95.0% of tweets combine both expositive and interactive resources: only 2.3% resort solely to expositive resources, and 2.7% solely to interactive resources. On average, each university uses 3.88 resources in its posts, and statistically significant differences are observed by region, where Latin America (4.13) and Europe (3.95) have a higher average than the United States (3.43).

Thus, the universities tend to combine the number and type of resources used. The results show that expositive and interactive resources are being used in a broad and integrated manner, although there are significant differences between the different types of resources used in each region (Table 7). Among the expositive resources, the most used are textual and, to a lesser extent, graphic. Among the interactive resources, the most used are referential and hypertextual. The presence of audiovisual resources (expositive) and participatory resources (interactive) is testimonial. By geographic area, Latin America's use of all resources is notable.

Table 7. Types of resources

Region	Expositive			Interactive		
	Textual	Graphic	Audiovisual	Referential	Hypertextual	Participatory
Europe	60.7	35.7	5.0	50.1	49.7	0.2
United States	65.3	28.8	4.9	49.3	56.8	0.1
Latin America	84.7	67.1	7.5	64.5	67.7	0.1
Total	72.7	47.1	6.1	56.1	59.9	0.1

In relation to Interactivity Strategy on *Twitter* (Table 8), the universities follow a similar pattern in the General Approach (LoGA), and with slight differences in the use of Resources (LoRE). Hence, all entities have a clear “monologic” interactivity strategy. They reveal a very informative approach (LoGA) with mainly expositive resources (LoRE). The results for Latin America stand out, above the general average, and with slight differences in relation to Europe and the United States.

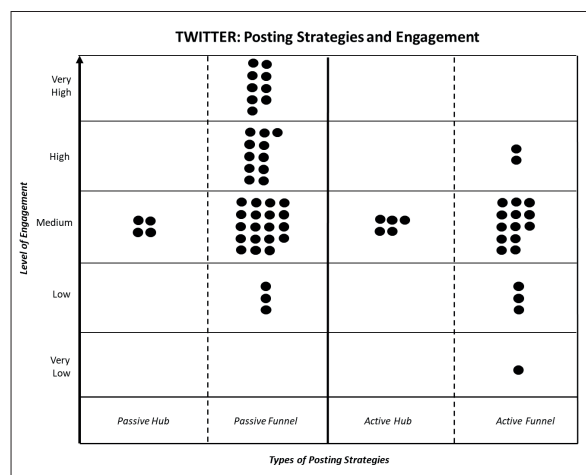


Figure 2. Scattering matrix. Posting strategy and engagement by universities

Table 6. Types of general approach

General approach	Informational (%)	Conversational (%)
Europe	94.2	5.8
United States	96.7	3.3
Latin America	88.8	11.2
Total	92.7	7.3

Table 8. Interactivity strategy by regions

Region	LoRE (1 to 5)	LoGA (1 to 5)	Interactivity strategy
Europe	2.28	1.21	Monologic
United States	2.23	1.14	Monologic
Latin America	2.32	1.44	Monologic
General	2.28	1.27	Monologic

The breakdown by universities in the scattering matrix shows that the institutions have a fairly homogeneous interactivity strategy on *Twitter*, with slight differences, both in the general approach used in their tweets (LoGA) and in their use of resources (LoRE) (Figure 3). Based on these differences, three subgroups were established within the general monologic strategy: “with a more expositive orientation” (entities scoring below 2 points in the LoRE), “with a more conversational orientation” (institutions scoring above 1.50 in the LoGA), and “with a more interactive-informational orientation” (universities with LoRE between 2 and 3 points and LoGA between 1 and 1.50 points), which is the majority subgroup.

With regard to the Engagement Level generated by interactivity strategies, since there is only one general strategy, comparisons cannot be established. It can be noted that the only strategy implemented by all universities (monologic, though with nuances) achieves a medium level of interaction (Table 9). The vast majority (60% of institutions) obtain a medium level, and a significant percentage (30%) achieve a high or very high level of engagement. Only 10% of entities obtain a low or very low level of interaction (Figure 4).

In respect of the subgroups, the existence of any significant difference in engagement within the general “monologic” strategy was analysed: it can be seen that the entities with a strategy “with a more expository orientation” and “with a more conversational orientation” are at a medium level of engagement, but below the general average. In turn, the entities “with a more interactive-informational orientation” strategy achieve a high level of interaction, above the overall average.

Table 9. Interactivity strategy and engagement by subgroups

Strategy (orientation)			Engagement	
Type	No.	%	GER	Level
Monologic (General)	70	100	0.476	Mean
More Expositive	10	14.3	0.207	Mean
More Conversational	15	21.4	0.331	Mean
More Interactive-Informational	45	64.3	0.585	High

4.3. Content strategy and engagement (RQ3 and RQ3a)

Concerning the Relevance of Topics (RoTO), the results (Table 10) show a clear predominance of “institutional” topics, both generally and by regions, although it is less pronounced in Latin America. Teaching topics enjoy fairly good presence (between 12 and 25%), while research, social engagement and context topics obtain hardly significant results (below 10%). These results may be considered coherent, taking into account that the universities’ institutional profiles have been analysed, and the institutions also have many other profiles on social networks (Departments, Faculties, Careers, Postgraduate studies, etc.) to deal more specifically with the other topics.

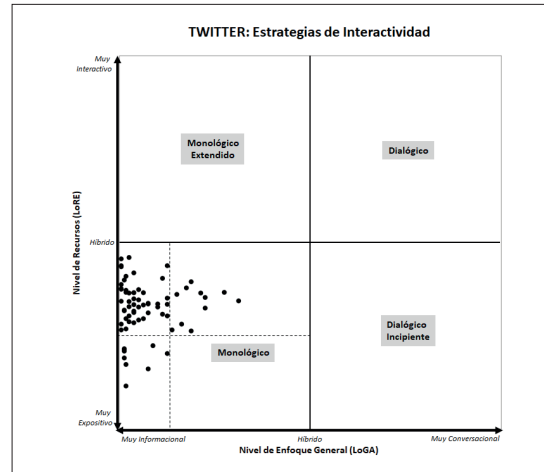


Figure 3. Scattering matrix. Interactivity strategy by universities

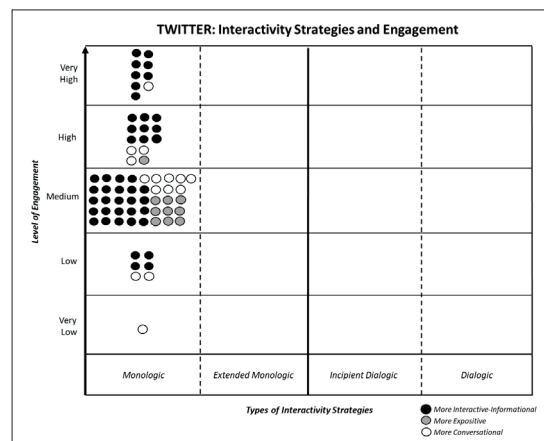


Figure 4. Interactivity strategy and engagement by universities

“The integrated strategy that yields superior interaction results demands increased effort and creativity in content creation, coupled with reduced activity intensity on this network”

Table 10. Topics by regions (%)

Region	Institutional	Teaching	Research	Social engagement	Context
Europe	72.05	14.74	10.58	0.88	1.75
United States	76.42	12.77	8.84	0.89	1.09
Latin America	63.20	23.39	4.88	3.89	4.56
Total	70.13	17.27	8.05	1.96	2.56

The “institutional” topic is a highly relevant issue in all universities, with very significant percentages (98.5% of the entities obtain more than 45%). To a much lesser extent, “teaching” topics are relevant in almost a third of universities, although with medium-high presence. The topics of research, social engagement and context can be considered irrelevant in communication on institutional profiles on *Twitter* (Table 11).

Table 11. Number of universities according to relevance of topics

Topics	Relevant (n)				Not relevant (n)	
	Very high	Quite high	High	Medium	Low	Very low
	+60%	45-60%	30-45%	20-30%	10-20%	-10%
Institutional	62	7	1			
Teaching		1	4	16	38	11
Research				1	21	48
Social engagement					1	69
Context					3	67

Regarding the Level of Combination (LoCO) of the topics (Table 12), it can be seen that 48 universities opt for a low combination of topics (of concentration), having a single, highly predominant topic (institutional matters in all cases), the other topics being hardly relevant. In the remaining 22 entities, a medium-level combination (of prioritization) of two themes (institutional and teaching issues, fundamentally) is implemented.

Table 12. Combination of content

Topics	Low combination	Medium combination	High combination
	1 preponderant topic	2 relevant topics	3 important topics
Institutional	48	22	
Teaching		21	
Research		1	
Social engagement			
Context			

Regarding Content Strategy on *Twitter* (Table 13), it noted as being mostly “exclusive” (clearly oriented towards institutional topics), with some differences between regions. In Europe and the United States, orientation is “exclusive” (concerning institutional issues) although in Europe the LoCO and RoTO values are significantly different. In Latin America, the strategy is “dominant” (with a combination of institutional and teaching topics), mainly due to a higher score for RoTO (with a lower weight of institutional content and a greater relevance of teaching-related posts).

Table 13. Content strategy by regions

Region	LoCO (1 to 5)	RoTO (1 to 5)	Content strategy
Europe	2.09	2.15	Exclusive
United States	1.81	1.80	Exclusive
Latin America	2.07	3.32	Dominant
General	2.00	2.47	Exclusive

The scattering matrix by universities reveals that there are multiple nuances in content strategies, although all institutions follow an “exclusive” or “dominant” strategy, with a notable preponderance of institutional content, complemented by teaching topics (Figure 5).

In relation to the Engagement Level obtained based on content strategies, the results (Table 14) show that “dominant” strategies achieve better results, since they have a high level of interaction, whereas “exclusive” strategies have a medium degree of interaction.

“The universities’ *Twitter* content strategy is identified as a limiting factor for fostering debates on scientific advancements and societal issues with users”

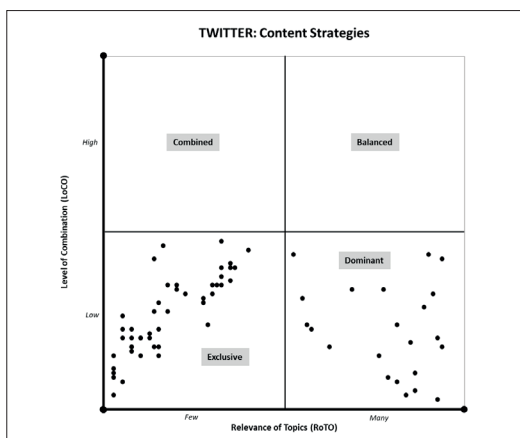


Figure 5. Scattering matrix. Content strategy by universities

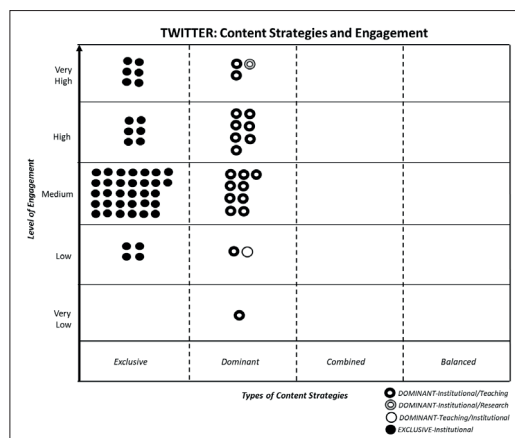


Figure 6. Content strategy and engagement by universities

Table 14. Content strategies and engagement

Type	Strategy		Engagement	
	No.	%	GER	Level
Exclusive	48	68.5	0.427	Mean
Dominant	22	31.5	0.583	High
General	70	100	0.476	Mean

So, as can be seen in the scattering matrix (Figure 6), although institutions mostly implement an “exclusive” strategy (of institutional content), the “dominant” strategy (in its various forms, mainly of institutional and teaching content) generally achieves better engagement results.

4.4. Integrated communication strategy on Twitter and engagement (RQ4 and RQ4a)

Regarding integrated strategies of communication on social networks, the results show that almost two-thirds of the universities (65.7%) implement a “Passive Monologic” strategy on Twitter (with low activity and a unidirectional approach to their posts) and a third of institutions (34.3%) have an “Active Monologic” strategy (with a good level of activity, but also with a unidirectional approach to their posts). No universities have been found to implement “dialogic” strategies (whether active- or passive-type) (Table 15).

Table 15. Integrated communication strategies on Twitter

Strategy	No.	%	Strategy	No.	%	Strategy	No.	%
Passive Monologic	46	65.7	Monologic Passive Funnel	42	60.0	Exclusive	27	38.5
						Dominant	15	21.5
			Monologic Passive Hub	4	5.7	Exclusive	4	5.7
Active Monologic	24	34.3	Monologic Active Funnel	19	27.2	Exclusive	15	21.5
						Dominant	4	5.7
			Monologic Active Hub	5	7.1	Exclusive	2	2.8
General	70	100		70	100		70	100

Within the “passive monologic” strategy, most of the universities (60%) follow an integrated “monologic passive funnel” strategy (with low activity, a unidirectional approach, and mostly proprietary tweets). In the “active monologic” strategy, just over a quarter of the entities (27.2%) follow an integrated “monologic active funnel” strategy (with high activity, a unidirectional approach, and mostly proprietary tweets). “Monologic passive hub” strategies (with low activity, a unidirectional approach and shared tweets) and “monologic active hub” strategies (with high activity, a unidirectional approach and proprietary tweets) have a very low presence (less than 10%). It can also be seen that in both general strategies (“passive monologic” and “active monologic”) “exclusive” content strategies are clearly preponderant (44.2% and 24.3% respectively, doubling “dominant” strategies) (Figure 7).

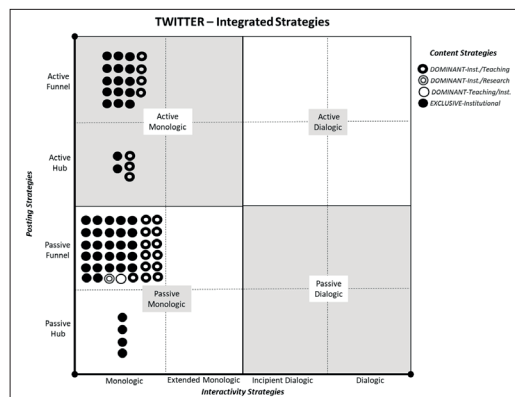


Figure 7. Scattering matrix. Integrated strategies on Twitter by universities

In respect of the Engagement Level obtained for the universities' different integrated communication strategies on *Twitter*, the "passive monologic" strategy is found to have a high level of interaction (higher than that recommended by the experts and much higher than the average obtained in the various sectoral studies), tripling the results achieved by the active monologic strategy, with a medium level of engagement (Table 16). Thus, the data suggest that a lower level of posting allows achieving better interaction results.

Table 16. Integrated strategies on *Twitter* and Engagement

Strategy	Engagement		Strategy	Engagement		Strategy	Engagement	
	GER	Level		GER	Level		GER	Level
Passive Monologic	0.621	High	Monologic Passive Funnel	0.664	High	Exclusive	0.621	High
						Dominant	0.741	High
			Monologic Passive Hub	0.166	Mean	Exclusive	0.166	Mean
						Dominant		
Active Monologic	0.199	Mean	Monologic Active Funnel	0.215	Mean	Exclusive	0.189	Mean
						Dominant	0.313	Mean
			Monologic Active Hub	0.139	Mean	Exclusive	0.122	Mean
						Dominant	0.151	Mean
General	0.476	Mean		0.476	Mean		0.476	Mean

The "monologic passive funnel" strategy stands out, with a high level of engagement, and results that triple or quadruple the other strategies. In addition, the "funnel" strategy (mostly proprietary posts) achieve better interaction than the "hub" strategy (a higher proportion of shared tweets). This shows that a low level of activity, together with a majority of proprietary tweets, markedly improves universities' interaction. Finally, the "dominant" content strategy (with key topics and other important complementary topics) has a higher level of engagement than the "exclusive" content strategy (with one, highly preponderant topic) in all types of strategies, although it is not the most implemented.

Therefore, the integrated strategy that achieves the best interaction results is one that combines "funnel" (mostly proprietary posts) and "passive" (low activity) posting, "monologic" interactivity (with a mainly unidirectional approach) and "dominant" content (combination of few key contents and complementary relevant contents).

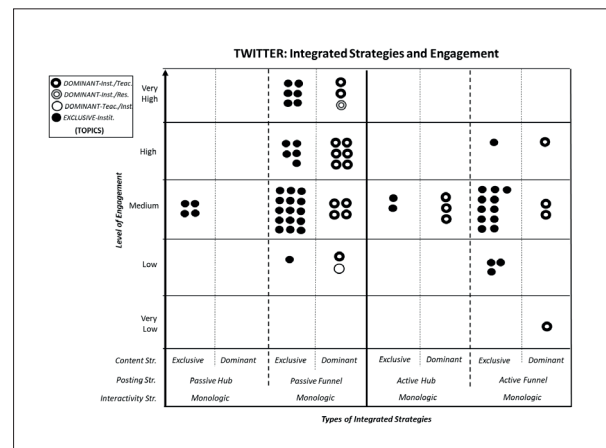


Figure 8. Integrated strategy on *Twitter* and engagement by universities

5. Conclusions

Based on the results obtained, we can present a set of reflections and draw some conclusions. Overall, the volume of tweets posted by the universities studied is, in general, within the average recommended by the experts (Capriotti; Zeler; Oliveira, 2021) and they achieve fairly good interaction with users according to studies in other sectors (Adobe, 2022; Feehan, 2022; Martínez, 2022). This could imply that these universities are making *Twitter* an adequate space for the dissemination of information and the construction of relations between their academic community and society in general. Some variations are noted between regions, with Latin America universities being more active than European and North American ones, also obtaining higher levels of engagement with their users.

Some variations are observed between regions, with Latin America being more active than Europe and the United States and obtaining higher engagement levels with its users. The higher level of activity may be since, in a post-pandemic context, Latin American universities may have needed to increase their digital activity to compensate for the lack of face-to-face activity and to strengthen their position as a source of information for their audiences (Kimmons; Veletsianos; Woodward, 2017), as well as to disseminate their educational offerings (Fährnich; Vogelgesang; Scharkow, 2020). The higher level of user interaction with the entities could be because Latin American universities have a better definition of the profile of their followers (with more homogeneous or similar characteristics) and thus would be responding better to the interests and preferences of users, disseminating activities and topics that are of greater interest and relevance (Capriotti; Oliveira; Carretón, 2023).

Regarding the Posting Strategy (RQ1) implemented by the universities and the Engagement Level (RQ1a) generated by these strategies, a fundamental idea can be established. The results reveal that the key to achieving good interaction on *Twitter* in the university sector is to generate a medium number of posts that are clearly prepared by the institution on *Twitter* in the university sector is to generate a medium number of posts that are clearly prepared by the institution itself (*passive funnel* strategy). This is the strategy generally used by many of the universities analysed. Users give greater

value to proprietary tweets about university activity rather than to a high, constant level of dissemination of information without a direct link to the universities (Marino; Lo-Presti, 2018; Salsé-Rovira; Jornet; Guallar, 2021). Hence, the results suggest that users would demand few posts whose narrative is high quality, proprietary and creative.

Regarding university institutions' Interactivity Strategy (RQ2) and the Engagement Level (RQ2a) generated by these strategies, it is observed that on *Twitter*, universities are applying a mainly *monologic* strategy, contrary to the suggestions of various studies (Guzmán-Duque; Del-Moral, 2013; Kimmons; Veletsianos; Woodward, 2017; Marino; Lo-Presti, 2018; Atarama-Rojas; Vega-Foelsche, 2020; Eger *et al.*, 2020). The results could indicate that university communication officers conceive communication strategies on *Twitter* as being more oriented to reporting on institutional activities, with little predisposition to interaction. However, and in line with previous research, the entities that employ a strategy with a "more interactive-informational" orientation achieve greater interaction (Peruta; Shields, 2016; Brech *et al.*, 2017; Ebrahim; Seo, 2019). These data reveal that the more interactive resources are used, the greater the interaction with users. Therefore, users would be demanding greater opportunities and possibilities for interaction with universities to establish a more direct relationship with the institutions.

In relation to the entities' Content Strategy (RQ3) and the Engagement Level (RQ3a) generated by these strategies, it is generally appreciated that universities focus on an *exclusive* content strategy with a great recourse to institutional topics. Thus, university institution communication officers would be focusing their communication actions on a single, highly prevalent topic in their *Twitter* posts. However, the greater interaction achieved by the *dominant* strategy used by Latin American universities points to a trend that the greater the diversification of topics on *Twitter*, the greater the interaction with users. While it is legitimate for universities to turn to social networks to increase their public visibility (Eger *et al.*, 2020; Gori *et al.*, 2020), the absence of topical variation reduces institutions' opportunities to create spaces for debate on scientific developments and social issues (Harper *et al.*, 2020). Thus, users seem to require universities to talk about a greater variety of topics related to their management and activity, as well as post on what is happening around them.

Regarding universities' Integrated Strategy (RQ4) on *Twitter* and the Engagement Level (RQ4a) generated, universities are mainly seen to develop (*funnel* type) passive monologic strategies, with a total absence of dialogic strategies. Hence, entities' communication management on *Twitter* has a clear profile of the dissemination of information to their publics, and with little orientation to dialogue. However, the integrated strategy to achieve the best interaction results is one that requires greater effort and creativity in content creation (diversity of topics, with the use of a good variety of resources) but with a lower intensity of activity on this network. In a digital environment with a large number of actors and possible interlocutors, users in the university environment would tend to demand digital activity that is less intense but highly creative and with high quality content, prepared with a combination of resources that enhance interaction.

Finally, this article proposes a holistic approach to the evaluation of communication strategy on *Twitter*, integrating various knowledge and variables that have been developed separately over the last 20 years. This will allow other researchers to use the method of analysis, which will strengthen this area of knowledge. In turn, it will also help communication professionals in universities, providing valuable data on the best options to focus posting, interactivity and content strategies on *Twitter*, which allows more efficient action in the dissemination of information about universities, while encouraging dialogue and interaction with their publics. However, as mentioned in the introduction, the recent changes to the platform (not only the name but mainly the changes in its structure and strategy) require new studies and analyses to assess the impact of these changes on the publication, interactivity and content strategies of the entities, as well as on the level of engagement of their users. These studies will also make it possible to compare the evolution of communication strategies in the new *X* to the previous *Twitter* to know the effects generated by the changes in social network management. Finally, although this research only analyses a certain type of institution (universities) on one specific social network (*Twitter*), in future research it will be relevant to apply it to other types of organizations (companies, government institutions, NGOs, etc.) and to other social networks (such as *Instagram*, *Facebook* or *TikTok*), to test and adjust its variables and dimensions.

6. References

- Abitbol, Alan; Lee, Sun-Young (2017). "Messages on CSR-dedicated *Facebook* pages: what works and what doesn't". *Public relations review*, v. 43, n. 4, pp. 796-808.
<https://doi.org/10.1016/j.pubrev.2017.05.002>
- Adobe (2022). "Your guide to social media engagement rates. Learn target engagement rates for *Facebook*, *LinkedIn*, *Instagram*, and *Twitter*". *Adobe Express*, 5 August.
<https://www.adobe.com/express/learn/blog/what-is-a-good-social-media-engagement-rate#what-is-a-good-social-media-engagement-rate>
- Albanna, Hanaa; Alalwan, Ali-Abdallah; Al-Emran, Mostafa (2022). "An integrated model for using social media applications in non-profit organizations". *International journal of information management*, v. 63, 102452.
<https://doi.org/10.1016/j.ijinfomgt.2021.102452>

- Alonso-Flores, Francisco-Javier; De-Filippo, Daniela; Serrano-López, Antonio-Eleazar; Moreno-Castro, Carolina** (2020). "Contribución de la comunicación institucional de la investigación a su impacto y visibilidad. Caso de la *Universidad Carlos III de Madrid*". *Profesional de la información*, v. 29, n. 6, e2090633.
<https://doi.org/10.3145/epi.2020.nov.33>
- Anderson, Betsy D.; Swenson, Rebecca; Gilkerson, Nathan D.** (2016). "Understanding dialogue and engagement through communication experts' use of interactive writing to build relationships". *International journal of communication*, v. 10, pp. 4095-4118.
<http://ijoc.org/index.php/ijoc/article/view/4569/1759>
- Atarama-Rojas, Tomás; Vega-Foelsche, Diego** (2020). "Comunicación corporativa y *branded content* en Facebook: un estudio de las cuentas oficiales de las universidades peruanas". *Revista de comunicación*, v. 19, n. 1, pp. 37-53.
<https://doi.org/10.26441/rc19.1-2020-a3>
- Brech, Felicitas M.; Messer, Uwe; Vander-Schee, Brian A.; Rauschnabel, Philipp A.; Ivens, Bjoern S.** (2017). "Engaging fans and the community in social media: interaction with institutions of higher education on Facebook". *Journal of marketing for higher education*, v. 27, n. 1, pp. 112-130.
<https://doi.org/10.1080/08841241.2016.1219803>
- Cancelo-Sanmartín, Mercedes; Almansa-Martínez, Ana** (2013). "Estrategias comunicativas en redes sociales. Estudio comparativo entre las universidades de España y México". *Historia y comunicación social*, v. 18, pp. 423-435.
https://doi.org/10.5209/rev_HICS.2013.v18.44339
- Capriotti, Paul; Losada-Díaz, José-Carlos; Martínez-Gras, Rodolfo** (2023). "Evaluating the content strategy developed by universities on social media". *Profesional de la información*, v. 32, n. 2, e320210.
<https://doi.org/10.3145/epi.2023.mar.10>
- Capriotti, Paul; Oliveira, Andrea; Carretón, Carmen** (2023). "A model for assessing the active presence of institutions on social media: application to universities worldwide". *Journal of marketing for higher education*, online first.
<https://doi.org/10.1080/08841241.2023.2166188>
- Capriotti, Paul; Zeler, Ileana** (2023). "Analysing effective social media communication in higher education institutions". *Humanities and social sciences communications*, v. 10.
<https://doi.org/10.1057/s41599-023-02187-8>
- Capriotti, Paul; Zeler, Ileana; Oliveira, Andrea** (2021). "Assessing dialogic features of corporate pages on Facebook in Latin American companies". *Corporate communications: an international journal*, v. 26, n. 5, pp. 16-30.
<https://doi.org/10.1108/CCIJ-10-2020-0149>
- Cho, Moonhee; Furey, Lauren D.; Mohr, Tiffany** (2016). "Communicating corporate social responsibility on social media: strategies, stakeholders, and public engagement on corporate Facebook". *Business and professional communication quarterly*, v. 80, n. 1, pp. 52-69.
<https://doi.org/10.1177/2329490616663708>
- Ebrahim, Husain; Seo, Hyunjin** (2019). "Visual public relations in Middle Eastern higher education: content analysis of Twitter images". *Media watch*, v. 10, n. 1, pp. 41-53.
https://journals.sagepub.com/doi/abs/10.15655/mw_2019_v10i1_49563
- Eger, Ludvík; Egerová, Dana; Tomczyk, Lukasz; Krystoň, Miroslav; Czeglédi, Csilla** (2020). "Facebook for public relations in the higher education field: a study from four countries Czechia, Slovakia, Poland and Hungary". *Journal of marketing for higher education*, v. 32, n. 2, pp. 240-260.
<https://doi.org/10.1080/08841241.2020.1781737>
- Fährnich, Birte; Vogelgesang, Jens; Scharkow, Michael** (2020). "Evaluating universities' strategic online communication: how do Shanghai Ranking's top 50 universities grow stakeholder engagement with Facebook posts?". *Journal of communication management*, v. 24, n. 3, pp. 265-283.
<https://doi.org/10.1108/JCOM-06-2019-0090>
- Feehan, Blair** (2022). *2022 social media industry benchmark report*. RivalIQ.
<https://www.rivaliq.com/blog/social-media-industry-benchmark-report-2022>
- Gheyle, Niels; Thomas, Jacobs** (2017). "Content analysis: a short overview. internal research note". *Internal research note*, December.
<https://doi.org/10.13140/RG.2.2.33689.31841>
- Gori, Elena; Romolini, Alberto; Fissi, Silvia; Contri, Marco** (2020). "Toward the dissemination of sustainability issues through social media in the higher education sector: evidence from an Italian case". *Sustainability*, v. 12, n. 11, 4658.
<https://doi.org/10.3390/su12114658>

- Guzmán-Duque, Alba-Patricia; Del-Moral, María-Esther** (2013). "Twitter's contribution to improving strategic communication in Latin American universities". *RUSC. Universities and knowledge society journal*, v. 10, n. 2, pp. 478-493.
<https://doi.org/10.7238/rusc.v10i2.1744>
- Harper, Luke; Herbst, Katherine W.; Bagli, Dàrius; Kaefer, Martin; Beckers, Goedele M. A.; Fossum, Magdalena; Kalfa, Nicolas** (2020). "The battle between fake news and science". *Journal of pediatric urology*, v. 16, n. 1, pp. 114-115.
<https://doi.org/10.1016/j.jpuro.2019.12.004>
- Huang, Jin; Yang, Aimei** (2015). "Implementing dialogic communication: A survey of IPR, PRSA, and IABC members". *Public relations review*, v. 41, n. 3, pp. 376-377.
<https://doi.org/10.1016/j.pubrev.2015.02.003>
- Johann, Michael; Wolf, Cornelia; Godulla, Alexander** (2021). "Managing relationships on Facebook: A long-term analysis of leading companies in Germany". *Public relations review*, v. 47, n. 3, 102044.
<https://doi.org/10.1016/j.pubrev.2021.102044>
- Kemp, Simon** (2023). *Digital 2023: global overview report*. Datareportal, 26 January.
<https://datareportal.com/reports/digital-2023-global-overview-report>
- Kent, Michael L.; Taylor, Maureen** (1998). "Building dialogic relationships through the world wide web". *Public relations review*, v. 24, n. 3, pp. 321-334.
[https://doi.org/10.1016/S0363-8111\(99\)80143-X](https://doi.org/10.1016/S0363-8111(99)80143-X)
- Kimmons, Royce; Veletsianos, George; Woodward, Scott** (2017). "Institutional uses of Twitter in U.S. higher education". *Innovative higher education*, v. 42, n. 2, pp. 97-111.
<https://doi.org/10.1007/s10755-016-9375-6>
- Landis, J. Richard; Koch, Gary G.** (1977). "The measurement of observer agreement for categorical". *Biometrics*, v. 33, n. 1, pp. 159-174.
<https://doi.org/10.2307/2529310>
- Lombard, Matthew; Snyder-Duch, Jennifer; Bracken, Cheryl-Campanella** (2002). "Content analysis in mass communication: assessment and reporting of intercoder reliability". *Human communication research*, v. 28, n. 4, pp. 587-604.
<https://doi.org/10.1093/hcr/28.4.587>
- Marino, Vittoria; Lo-Presti, Letizia** (2018). "Approaches to university public engagement in the online environment: insights from Anglo-Saxon higher education". *International journal of educational management*, v. 32, n. 5, pp. 734-748.
<https://doi.org/10.1108/IJEM-10-2016-0215>
- Martínez, Clàudia** (2022). "What is a good engagement rate for the different social networks?". *Cyberclick agent*, 5 April.
<https://www.cyberclick.net/numericalblogen/what-is-a-good-engagement-rate-for-the-different-social-networks>
- Oliveira, Andrea; Capriotti, Paul; Zeler, Ileana** (2022). "El estado de la cuestión de la investigación sobre la comunicación digital de las universidades". *Redmarka, revista de marketing aplicado*, v. 26, n. 2.
<https://doi.org/10.17979/redma.2022.26.2.9240>
- Peruta, Adam; Shields, Alison B.** (2016). "Social media in higher education: understanding how colleges and universities use Facebook". *Journal of marketing for higher education*, v. 27, n. 1, pp. 131-143.
<https://doi.org/10.1080/08841241.2016.1212451>
- Rutter, Richard; Lettice, Fiona; Nadeau, John** (2017). "Brand personality in higher education: anthropomorphized university marketing communications". *Journal of marketing for higher education*, v. 27, n. 1, pp. 19-39.
<https://doi.org/10.1080/08841241.2016.1213346>
- Salsé-Rovira, Marina; Jornet, Núria; Guallar, Javier** (2021). "El patrimonio universitario desde una perspectiva GLAM . Análisis de los sitios web de las universidades". *Revista general de información y documentación*, v. 31, n. 2, pp. 521-543.
<https://doi.org/10.5209/rgid.77215>
- Sataoen, Hogne-Lerøy; Waeraas, Arild** (2016). "Building a sector reputation: the strategic communication of national higher education". *International journal of strategic communication*, v. 10, n. 3, pp. 165-176.
<https://doi.org/10.1080/1553118X.2016.1176567>
- Simancas-González, Esther; García-López, Marcial** (2017). "Gestión de la comunicación en las universidades públicas españolas". *El profesional de la información*, v. 26, n. 4, pp. 735-744.
<https://doi.org/10.3145/epi.2017.jul.17>
- Statcounter** (2023). *Statcounter*.
<https://statcounter.com>

Statista (2023). *Previsión del número de usuarios mensuales activos (MAU) de Twitter a nivel mundial desde 2021 hasta 2024*. Statista.

<https://es.statista.com/estadisticas/636174/numero-de-usuarios-mensuales-activos-de-twitter-en-el-mundo>

Stsiampkouskaya, Kseniya; Joinson, Adam; Piwek, Lukasz; Stevens, Lorna (2021). "Imagined audiences, emotions, and feedback expectations in social media photo sharing". *Social media and society*, v. 7, n. 3.

<https://doi.org/10.1177/20563051211035692>

Theunissen, Petra; Wan-Noordin, Wan-Norbani (2012). "Revisiting the concept 'dialogue' in public relations". *Public relations review*, v. 38, n. 1, pp. 5-13.

<https://doi.org/10.1016/j.pubrev.2011.09.006>

Voorveld, Hilde A. M.; Van-Noort, Guda; Muntinga, Daniël G.; Bronner, Fred (2018). "Engagement with social media and social media advertising: the differentiating role of platform type". *Journal of advertising*, v. 47, n. 1, pp. 38-54.

<https://doi.org/10.1080/00913367.2017.1405754>

Zeler, Ileana; Capriotti, Paul; Oliveira, Andrea (2023). "30 años de producción científica sobre comunicación institucional de las universidades: evolución histórica del 1990 al 2020". *Estudios sobre el mensaje periodístico*, v. 29, n. 1, pp. 235-246.

<https://doi.org/10.5209/esmp.80639>

Zerfass, Ansgar; Buhmann, Alexander; Tench, Ralph; Verčič, Dejan; Moreno, Ángeles (2021). *European communication monitor 2021. Comm tech and digital infrastructure, video-conferencing, and future roles for communication professionals. Results of a survey in 46 countries*. Brussels: Euprera; EACD.

<https://www.communicationmonitor.eu/2021/05/21/ecm-european-communication-monitor-2021>

7. Annexes

Appendix 1. Sample of universities

Europe	United States	Latin America
University of Oxford	Harvard University	Universidad de Buenos Aires
University of Cambridge	Stanford University	Universidad Nacional de Córdoba
University College London	MIT (Massachusetts Institute of Technology)	Universidad Nacional de La Plata
Imperial College London	Princeton University	Universidad Austral
University of Edinburgh	Columbia University	Universidade de São Paulo
University of Manchester	California Institute of Technology (Caltech)	Universidade de Campinas
King's College London	University of Chicago	Universidade Federal de Rio de Janeiro
University of Bristol	Yale University	Universidade Federal de Minas Gerais
London School of Economics and Political Science	Johns Hopkins University	Universidade Católica de Rio de Janeiro
University of Warwick	University of Pennsylvania	Universidade Católica de Rio Grande Sul
Sorbonne University	University of Michigan - Ann Arbor	Universidad de Chile
Paris Science et Lettres - PSL	University of North Carolina - Chapel Hill	Pontificia Universidad Católica de Chile
Paris Saclay	University of California - Berkeley	Universidad de Concepción
Heidelberg University	University of Washington - Seattle	Universidad de Santiago de Chile
University of Munich (LMU)	Purdue University - West Lafayette	Universidad Nacional de Colombia
Technical University of Munich	University of Illinois - Urbana Champaign	Universidad de Antioquia
Swiss Federal Institute of Technology Zurich	University of Texas - Austin	Pontificia Universidad Javeriana
University of Zurich	University of Wisconsin - Madison	Universidad de Los Andes (Colombia)
Swiss Federal Institute of Technology Lausanne	University of Maryland - College Park	Universidad Nacional Autónoma de México
Utrecht University	University of Minnesota - Twin Cities	Universidad Autónoma Metropolitana
University of Amsterdam		Benemérita Universidad Autónoma Puebla
Karolinska Institute		TEC de Monterrey
University of Oslo		Universidad Nacional Mayor de San Marcos
University of Helsinki		Universidad San Francisco de Quito
University of Copenhagen		Universidad de la República

Appendix 2. Posting strategy

Level of Activity (LoAC)

Activity	Daily average	Result LoAC	Scale LoAC
Low	0.1 to 2.9	1.0 to 2.0 p.	Very low (1.0 – 1.79 p.) Low (1.8 – 2.59 p.) Medium-low (2.6 – 3.09 p.) Medium-high (3.1 – 3.59 p.) High (3.6 – 4.29 p.) Very high (4.3 – 5.0 p.)
Medium	3.0 to 5.0	2.1 to 3.0 p.	
High	5.1 to 7.0	3.1 to 4.0 p.	
Very high	7.1 to 9+	4.1 to 5.0 p.	

Type of Presence (ToPE)

Presence	Frequency (N)	Assigned value (VA)	Result ToPE	Scale ToPE
Shared	No. tweets	1 p.	=Mean (N*VA/3)	Highly shared (1.0 – 1.7 p.) Quite shared (1.8 – 2.5 p.) Hybrid (2.6 – 3.4 p.) Quite proprietary (3.5 – 4.2 p.) Highly proprietary (4.3 – 5.0 p.)
Hybrid	No. tweets	1.5 p.		
Proprietary	No. tweets	2 p.		

Posting strategies

Passive Funnel	Passive Hub	Active Funnel	Active Hub
Low Level of Activity, between 1.0 & 3.0 points	Low Level of Activity, between 1.0 & 3.0 points	High Level of Activity, between 3.0 & 5.0 points	High Level of Activity, between 3.0 & 5.0 points
Type of Presence mainly proprietary, between 3 & 5 points	Type of Presence mainly shared, between 1 & 3 points	Type of Presence mainly proprietary, between 3 & 5 points	Type of Presence mainly shared, between 1 & 3 points

Appendix 3. Interactivity strategy

Level of General Approach (LoGA)

General approach	Frequency (N)	Assigned value (VA)	Result LoGA	Scale LoGA
Informational	No. tweets	1 p.	=Mean (N*VA/2)	Very informational (1.0 – 1.7 p.) Quite informational (1.8 - 2.5 p.) Hybrid (2.6 – 3.4 p.) Quite conversational (3.5 – 4.2 p.) Muy conversational (4.3 – 5.0 p.)
Conversational	No. tweets	2 p.		

Level of resources (LoRE)

Resources	Type of resources	Frequency (N)	Assigned value (VA)	Result LoRE	Scale LoRE
Text	Expositive	No. tweets	1.0 p.	=Mean (N*VA/6)	Very expositive (0.1 – 1.0 p.) Quite expositive (1.1 – 2.0 p.) Hybrid (2.1 – 3.0 p.) Quite interactive (3.1 – 4.0 p.) Very interactive (4.1 – 5.0 p.)
Graphic	Expositive	No. tweets	1.75 p.		
Audiovisual	Expositive	No. tweets	2.5 p.		
Referential	Interactive	No. tweets	3.5 p.		
Hipertextual	Interactive	No. tweets	4.25 p.		
Participative	Interactive	No. tweets	5.0 p.		

Interactivity strategies

Monologic	Extended monologic	Incipient dialogic	Dialogic
Level of General Approach Informational, between 1 & 3 points.	Level of General Approach Informational, between 1 & 3 points.	Level of General Approach Conversational, between 3 & 5 points.	Level of General Approach Conversational, between 3 & 5 points.
Level of Resources Expositive, between 1 & 3 points.	Level of Resources Interactive, between 3 & 5 points.	Level of Resources Expositive, between 1 & 3 points.	Level of Resources Interactive, between 3 & 5 points.

Appendix 4. Content strategy

Relevance of topics (RoTO)

Relevant				No relevant	
Very high	Quite high	High	Medium	Low	Very low
More than 60%	Between 45% and 60%	Between 30 and 45%	Between 20% and 30%	Between 10% and 20%	Less than 10%

Level of combination (LoCO)

Low combination	Medium combination	High combination
1 preponderant topic	2 preponderant topics	3 preponderant topics
1 key preponderant topic, with percentage higher than 50% of total, and others with less than 20%.	2 key preponderant topics, with percentage higher than 30% and lower than 50%, and others with less than 20%.	3 key preponderant topics, with percentage higher than 20% and lower than 30%, and others with less than 20%.

Content strategies

Balanced	Combined	Dominant	Exclusive
3 topics or more: Medium, High (20-45%) Others: Low, Very low (less than 20%)	2 topics: High (30-45%) Others: Low, Very low (less than 20%)	1 topic: Quite high, Very high (+45%) 1-2 topics: Medium (20-30%) Others: Low, Very low (less than 20%)	1 topic: Very high (+60%) Others: Low, Very low (less than 20%)

Appendix 5. Integrated communication strategy in social media

Strategies	Integrated strategies			
	Passive monologic	Active monologic	Passive dialogic	Active dialogic
Posting strategy	Passive Hub ----- Passive Funnel	Active Hub ----- Active Funnel	Passive Hub ----- Passive Funnel	Active Hub ----- Active Funnel
Interactivity strategy	Monologic ----- Extended Monologic	Monologic ----- Extended Monologic	Incipient Dialogic ----- Dialogic	Incipient Dialogic ----- Dialogic
Content strategy	Balanced ----- Combined ----- Dominant ----- Exclusive	Balanced ----- Combined ----- Dominant ----- Exclusive	Balanced ----- Combined ----- Dominant ----- Exclusive	Balanced ----- Combined ----- Dominant ----- Exclusive

Appendix 6. Level of engagement

Level of engagement		Recommended mean	Obtained mean
Very high	Higher than the level recommended by experts and the average level of engagement of sector studies.	More than 1	More than 0.07
High	At the average level recommended by experts, but higher than the average level of engagement in sector studies.	Between 0.5 & 1	More than 0.07
Medium	Lower than the level recommended by experts, but higher than the average level of engagement in sector studies.	Less than 0.5	More than 0.07
Low	Lower than the level recommended by experts, but in the middle of the average level of engagement of sector studies.	Less than 0.5	Between 0.04 y 0.07
Very low	Lower than the level recommended by experts and the average level of engagement in sector studies.	Less than 0.5	Less than 0.04