

Engagement and Experience Co-Creation: An Analysis of Hotel Instagram Profiles in Porto

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Abstract

This article aims to delve deeper into tourists' interaction with content uploaded to the Instagram social network by hotel profiles. Several research questions are stated regarding hotel characteristics, the co-creation dimension, and the type of media posted on Instagram that affect use, activity, audience, and engagement. Our work performs an engagement analysis of the Instagram profiles of 171 hotel establishments in Porto (Portugal). We examined 10,017 Instagram posts from the accounts' inception to July 2022, representing the entire dataset. Using complete and unfiltered data is crucial to perform robust and reliable analyses. Data were collected using Instaloader, an advanced Open Source Intelligence (OSINT) technique, widely validated in recent research. From the hotel's perspective, the results demonstrate carelessness in communication and little importance given to planning interaction and co-creation on social networks. In line with previous research, star-rated hotels and those with larger capacities tend to have a more active presence on Instagram. Regarding higher levels of engagement, focusing on quality over quantity in posts is recommended. Reinforcing content that includes photographs of the destination and hotel simultaneously (a holistic perspective of co-creation) seems to enhance engagement. Hotels should encourage customers to provide feedback to improve their experiences and leverage quality images to obtain higher engagement. More empirical research is needed in engagement analysis on social media. From a theoretical perspective, the study contributes to understanding the role of tourists in co-creation, reinforcing the need to foster engagement between tourists and hotels through Instagram. From a practical view, the methodology can be replicated by companies to analyze which content generates higher engagement and to develop better strategies for co-creating experiences and enhancing brand value. To our knowledge, this is the first work applying engagement analysis to hotel Instagram profiles in relation to post characteristics and co-creation.

Key Words: Engagement analysis; Instagram; Accommodation; Co-creation of experiences; Tourism; Porto, Portugal

JEL Classification: D91, O33, Z33

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1. Introduction

Social media are very attractive to engage with consumers (Erdmann & Eizaguirre, 2024) and must be considered in companies' marketing planning (Stefko et al., 2013). Tourists intend to spend part of their free time exploring and discovering the destination based on living unique and memorable experiences. Companies try to innovate and find new ways of engaging consumers in their activities and services, but there (Ferencakova et al., 2020). The co-creation experience is taking over product and company-centric innovations as a basis for value. According to Sarasvuo et al. (2022), co-creation can be understood as creating together, having in consideration all the stakeholders, with customers having a central role in this process. The co-creation process results from interaction, and the final result of these interactions is the experiences lived and perceived by tourists. The co-creation process has been investigated from different perspectives, such as strategy, management, and marketing. Yet, its application in tourism and hospitality is of great importance due to its innate nature of being an active potential service provider (Chathoth et al., 2016). In this industry, co-creation is presented as the participation of the tourist in the preparation of the products, services, or experiences provided (Emmendoerfer et al., 2023). Customer engagement with companies' posts will influence the extent to which the messages spread (Ferencakova et al., 2020; Saura et al., 2023). The more interesting these messages are, the more interaction and reach they will have. Consumers are achieving more control and power in the co-creation process (Esther & Teun Den, 2009), and companies must rise to this challenge, showing themselves to be available, flexible, and open to new solutions, namely through the use of social networks. Related to social media user engagement behaviours with hotel brands, Creevey et al. (2019) state that the believing phase (that being consumer activity post-purchase but pre-consumption) represents an under-researched phase of the travel cycle.

The concept of engagement also presupposes mostly involvement and interaction (Tugores-Ques & Bonilla-Quijada, 2023; Chetthamrongchai & Saengchai, 2019). Theoretically, the higher interaction on the social network profile, the greater engagement and, thus, the co-creation process becomes easier. Those companies that generate more involvement and interaction will have higher engagement and, thus, more information to work on the current and future co-creation process, as well as, being able to strengthen relationships with all those who interact with the profile, including potential tourists. According to the new perspective of the engagement theory developed by Pansari and Kumar (2017), engagement occurs only after a relationship is formed based on trust and commitment, and, thus, when a relationship is satisfying and has emotional connectedness, the partners become engaged in their concern for each other. These authors propose satisfaction and emotion as the two tenets of the engagement theory. In this context, social media content constitutes a significant source of information, still little explored by scholars, since tourists share significant information and interact with others, reflecting their emotions, purchase intentions, satisfaction, expectations, lived and desired experiences.

The concept of "customer engagement" has been widely explored by a variety of scholars from different disciplines; there is a consensus that a high level of user engagement is likely to improve brand visibility, increase purchase intentions, and improve profitability. Thus, it becomes essential to the success of marketing and sales activities (Cheung et al., 2015). Since emotions can be frequently updated in social media by tourists, it would be interesting to use data from multiple time periods to understand the effect of changes in the services provided on customer behaviour and engagement. Pansari and Kumar (2017) propose to test the engagement framework over a period of time and across industries to provide additional meaningful insights. In addition to the Instagram network, there is a need to study customer engagement on social networks for companies of different sizes, according to the types of appeals or images (Ferencakova et al., 2020). An additional opportunity for investigation would be to address the content of a particular social media activity of brands and assess the qualitative differences between them (Erdmann & Eizaguirre, 2024).

Taking into account technological advances, particularly in information technology and web communication, as well as the changes they bring to people's lives, we are witnessing rapid changes in

consumer and tourist behavior (Buonincontri & Micera, 2016; Zhang et al., 2018; Hoang et al., 2023). In this vein, Lee et al. (2021) emphasize that digital technologies are creating new opportunities for service innovation in the tourism industry. The study of the tourists' "state of mind" and the analysis of the content of their "posts" and "shares" on social networks, specifically about the accommodation where they stay overnight, will be reflected in the image created by them in relation to the destination or touristic services.

The need for further scientific research in this topic is also reinforced by Trunfio & Campana (2019) that highlighted some questions that need to be answered in the future, such as, how companies, Destination Management Organizations (DMOs) and political actors can exploit the disruptive power of digital platforms to facilitate knowledge sharing, trust and collaboration in the local community to increase the co-creation of experiences.

Social media, engagement, and hotels represent emerging topics, as recent data from WoS shows a notable increase in the number of publications on these themes. According to Leung et al. (2013), this area is gaining traction due to its potential to influence how tourists engage with hotel services through social media.

In this context, this article studies the contents of the profiles of hotel establishments on the social network Instagram, applying an engagement analysis and taking into consideration the multidimensionality of the co-creation process.

Drawing on the engagement theory, this article aims to delve deeper into the tourists' interaction with the content uploaded to the Instagram social network by the hotels' profiles. To answer this central issue, the authors emphasize measuring the level of engagement in a digital context and also aim to answer the following specific research questions (RQ):

RQ1: Which are the hotel characteristics that affect the use, activity, audience and engagement on Instagram?

RQ2: What is the co-creation dimension posted on Instagram by hotels that generates the highest engagement?

RQ3: What is the type of media posted on Instagram by hotels that generates the highest engagement?

To the best of our knowledge, this is the first work that applies engagement analysis to the profiles of hotel establishments on Instagram, in relation to the characteristics of the posts and their content, having in perspective the co-creation of experiences. From a theoretical perspective, the study contributes to deepening the topics of the engagement theory applied to tourism, exploring the social network Instagram. Cumulatively, our work shows practical implications for tourist companies and institutions in order to reproduce the method to analyse which content generates higher engagement to develop more effective strategies for valuing their brands.

The architecture of this article presents itself with the following structure. In the next section, we include a literature review on engagement analysis and on the Instagram relevance for the co-creation process. Subsequently, section three describes the methodology and section four presents the results. The article ends with the main conclusions.

2. Literature review

Considering the intersection of the topics under analysis, our search found that the analysis of the topics' engagement in tourism and Instagram did not record a significant number of publications in the WoS database. Using the terms "touris* engagement analysis and instagram", on June 22, 2023, the scientific platform Web of Science (WoS) presented 30 articles published between 2016 and 2023. By performing a manual analysis of titles, abstracts, keywords, results and conclusions, the authors were able to verify that despite the term engagement appearing in these articles, those who studied

engagement in hotels focused on the analysis of hashtags (Almeida et al., 2023) or on the online presence in several digital platforms (Leite & Azevedo, 2017). Using the terms "customer engagement in tourism* and Instagram", the results were limited to just eight articles. Carrying out a new, more specific search for tourist accommodation, using "customer engagement in hospitality and instagram", the results obtained were 14 documents and the majority do not refer to hotels but rather restaurants (Ibrahim & Aljarah, 2024) or destinations (Tugores-Ques & Bonilla-Quijada, 2023).

2.1 Theoretical framework

Engagement and co-creation are two interconnected concepts. Both share involvement and interaction and seek to measure the level of participation of those interacting. In the tourism industry, this interaction has the tourist/client at the core of the process (Hernández-Ortega and Franco, 2019), and when referring to the digital context, the user. The academia is unanimous in stating that there is no co-creation without interaction. Co-creation refers to the process of the creating value for the tourist. This value creation is reflected in the experience gained. These perspectives of involvement and interaction can be analysed from the view of the recent evolution of the main theories of value creation, associated with the co-creation of tourism experiences, considering the use of new technologies (in particular, associated with the internet).

The Value Co-Creation theory highlights that technology facilitates co-creation by empowering customers, giving them more autonomy and providing greater connectivity, offering greater access to information and rapid dissemination (Zhang et al., 2020). Thus, the use of technology amplifies the role of interactions between companies and tourists (Line et al., 2020). When referring to the digital revolution in tourism, the concept of the sharing economy is also associated (Buhalis et al., 2020).

Other authors consider co-creation to be at the basis of Service Dominant Logic (SDL) that places services instead of products at the centre of the economic exchange (Vargo & Lusch, 2004). According to SDL, a customer is no longer considered a target to reach with positioning strategies but must be seen as an active resource who should be involved in the value creation process. The role of consumers is highlighted, and tourists contribute to the service experience for other tourists (Mohammadi et al., 2020). Co-creation and engagement are a very dynamic system with multiple participants, knowing communities, and social media technologies that are constantly interacting with one another (Sharma et al., 2020).

The Technology Enhanced Experience theory states that experiences do not only happen in the physical domain, but also in online virtual spaces at the same time, highlighting the integration of Information and Communication Technology and co-creation (Femenia-Serra & Neuhofer (2018). The Service Science theory also emphasizes that interaction with technology and the service system is what explains the co-creation of value (Alcoba et al., 2017).

The Structured Experience theory identifies four co-created subjective experiences: immersion, absorption, engagement, and deep structured experience. According to this theory, engagement is a transitory condition of heightened attention, emotion, and motivation that do not occur in isolation (Ellis et al., 2019). Thus, interaction is crucial to develop engagement.

According to the theory of engagement (Pansari & Kumar, 2017), a positive customer experience with a hotel or a brand leads to customer engagement, which comprises direct contributions (purchase) and indirect contributions (engagement and co-creation of experiences, incentivized referrals, and social media conversations). Tourists are considered as active co-creators of value in collaboration with hotels. Therefore, it is imperative for organizations to recognize tourists as key stakeholders and involve them in the co-creation of value. The concept of value co-creation has gained significant traction since its inception, with both practitioners and scholars showing a growing interest in SDL (Vargo & Lusch, 2004).

These theories emphasize the role of tourists in co-creation and place these actors at the center of the whole process, reinforcing the need for engagement between consumers (tourists) and companies.

2.2 Engagement analysis

The engagement analysis assesses the level of involvement in a given context or activity by studying and measuring the extent to which individuals actively participate, contribute, and interact within a given system, process, or relationship (Spreng & Mackoy, 1996; Brodie et. al., 2011). This methodology helps stakeholders to identify areas for improvement and make informed decisions (Castiblanco Jimenez et al., 2023). Key elements include identifying engagement indicators, data collection, data analysis, interpretation and discussion of results, and recommendations (Brodie et. al., 2011). To this end, surveys, observational studies, interviews, social network analysis, digital analytics, and text mining can be employed, depending on research objectives (Hao, 2020).

The interest in this methodology has grown significantly and it is applicable in diverse domains, including tourism, where customer engagement is crucial for understanding interactions between tourists and providers (Tugores-Ques & Bonilla-Quijada, 2023; Bonilla-Quijada et al., 2021). Since interaction is in the base of the co-creation process, this engagement perspective is crucial to better understand the process of creating experiences. The research gap is evident in hotel engagement analysis as well as in specific destinations like Porto.

In tourism, customer engagement topics include social media, customer experience, and brand prestige (Kaur et al., 2023). Sub-forms like Online Customer Engagement, Tourist Engagement, Customer Brand Engagement, and Customer Engagement Behavior are also identified (Hao, 2020). The analysis of the Online Customer Engagement on platforms such as social networking sites and booking websites is considered crucial (Aydin, 2020; Guerreiro et al., 2024; Li et al., 2019).

In scientific Instagram studies, the content interaction analysis is commonly applied (Almeida et al., 2023; Avelino et al., 2020). Different authors recently analysed various content aspects such as photographs and hashtags (Aramendia-Muneta & Olarte-Pascual, 2023; Gunter & Onder, 2021) as well as different methodologies, including netnography and textual content analysis (Conti & Lexhagen, 2020; Oliveira & Panyik, 2015).

2.3 The use of Instagram in the accommodation sector

Social networks play a crucial role in brand awareness, positioning, and interaction with communities, impacting tourist perceptions (Oliveira & Panyik, 2015). Instagram is among the most used social networking platforms in the world, estimating that by 2023 this network will have nearly 1.2 billion users worldwide (Statista, 2022).

Co-creation is the process of interaction and social media could be the support of this interaction. Social networks can be assumed as an excellent strategy to reinforce and apply the co-creation process of tourism experiences. Digital technologies have revolutionized the co-creation process of tourist brands, making the interaction and participation in this process faster and free of charge, becoming a strategic tool that companies can leverage to create lasting and positive relationships with their audiences. This virtual dialogue between brands and tourists, or even between potential users, has the advantage of being able to be worked on before, during and after the trip. Thus, the co-creation process is the result in multiple interactions, carried out either simultaneously or at different timings.

Travellers are increasingly using social media and Instagram to express their perceptions, thoughts, emotions or even feelings about the touristic service brands or tourism destinations (Xiang and Gretzel, 2010; Mak, 2017; Filieri et al. 2021). Tourists make a relevant contribution to the co-

creation of destination image through posting different contents (text, images, videos, hashtags, emojis or likes) of their travel experiences in the destinations in the social media (Filieri et al. 2021) and this contribution is going to influence the perception of other users or future tourists.

Some studies have tried to scientifically analyse the interaction developed on Instagram between tourists or users with companies and destinations. The addition of text subtitles, hashtags and tags or other content customizations, allow tourists to highlight the importance of the experiences lived and add value for a better perception of the global evaluation (Conti & Lexhagen, 2020).

In addition, few researchers have used images to understand the emotions and feelings associated with publications, with this type of interaction being one of the most popular (Aro et al., 2018; Oliveira & Panyik, 2015; Filieri et al. 2021). In this vein, Kim & Stephenkova (2015) analysed the intention to visit the destination through the images already published, but not the associated feelings and emotions. Conti & Lexhagen (2020) explore the role of online photography in creating experience value in nature-based tourism and reinforce that it is important to pay more attention to the functional capacity of online photography on Instagram to act as a performative tool to better understand the experience value.

Instagram is an open social network that integrates all types of users. In the specific case of tourism, there is a wide range of relevant users, including tourists, curious visitors, tourism companies, public entities that manage the destination, service companies and locals. For the co-creation process, the interactions generated between these actors and an accommodation company are very relevant and should be studied. Scientific research on the co-creation process has evolved to reinforce this holistic perspective of interactions. The academic literature on co-creation is focused on the perspective of the customer-firm interaction (Freire & Veríssimo, 2021), although there are other types of relevant interactions to this process, namely between companies and residents, public agents, educational entities, or even the destination, that should be studied. Tourist can use several of her/his resources in this participation, such as time, effort, knowledge, skills and technological tools, among many others (Prahalad & Ramaswamy, 2004). Knowing that Instagram users can be any of these stakeholders, studying user interactions and engagement with accommodation units' profiles on Instagram allows us to have a broader perspective of the content and experiences that are more or less valued by these agents who intervene in the co-creation process. In the future, it would be very interesting to be able to classify interactions by user types, but as there are many private accounts, this analysis becomes very difficult and represents a limitation.

Taking into account the literature review, it is understood that there are few studies that analyse the social network Instagram in the context of the tourism sector. The research gap is evident in hotel engagement analysis in specific destinations like Porto, being even more notable in the context of deepening the study of the co-creation of experiences. The authors aim to fill this gap and consider that understanding and analyzing engagement on social networks, and particularly on Instagram, is crucial to gathering information and proposing innovative services that result in experiences that are effectively valued by tourists.

3. Methods

3.1 Data collection

Our study focused on 171 hotel establishments in the Porto area, including Matosinhos and Vila Nova de Gaia, sourced from the Turismo de Portugal (2022) database. Data was gathered from verified Instagram accounts belonging to these accommodations, of which only 90 were found. The analysis covered posts from the inception of the accommodations' Instagram accounts up to June 30, 2022, totalling 10,017 posts, representing the entire dataset. Data collection was carried out in July 2022

following advanced Open Source Intelligence (OSINT), a technique widely validated in recent research, (Williams & Blum, 2018; Bonsón et al., 2019). These authors highlight their ability to overcome the limitations imposed by restricted APIs and also to avoid sampling biases. In line with the 'N=All' approach proposed by Mayer-Schönberger and Cukier (2013), the analysis ensures the inclusion of all the available data, ensuring a comprehensive and accurate representation of digital interaction dynamics. The use of advanced tools such as Instaloader (Graf, 2017), employed in this research, allowed for the comprehensive capture of visual content, descriptions and associated data, essential elements for a deep and representative analysis of the digital engagement and activity of these accounts.

Subsequently, the analysis of the activity on Instagram was carried out by counting the total number of posts on the verified accounts of each establishment, while the audience was measured based on the number of followers of each account. This methodological approach not only ensures a replicable and comprehensive analysis, but also provides a robust framework for future research in the evaluation of digital strategies in the tourism sector.

3.2 Engagement analysis

User engagement was measured using an adaptation of the citizen reaction metrics from Perea et al. (2021) based on the engagement metrics developed by Bonsón & Ratkai (2013). These metrics have been also used recently by that other authors such as Raimo et al. (2024). The Instagram's own interactions considered are likes and comments. Additionally, the number of followers reflects the online audience, indicating how many users are engaged with the hotel's posts, while the number of posts indicates the page's activity level. Following Perea et al. (2021), we used the number of likes and comments per post to calculate two metrics: (1) Popularity score (average likes per post x 1,000 / total post likes), which measures the user acceptance of the post, and (2) Commitment score (average comments per post x 1,000 / total post comments), which can be used as a proxy to gauge users' interest in commenting and their interaction level with the hotel.

These two metrics effectively capture online user engagement, as they represent the most prevalent forms of interaction between on social media platforms (Contri et al. 2024; Garrote-Quintana et al. 2025; Han & Baird, 2022). To construct the engagement index, we divided the total interactions (likes and comments) across all posts by the total number of posts, then divided the result by the total number of followers and multiplied by 1,000. This gives a relative measure of user engagement with the posts, expressed as an average per thousand followers. A higher value indicates a stronger engagement level. This index enabled us to analyse whether Porto hotels utilized its official Instagram profiles to foster user engagement.

$$Engagement = \frac{(\text{Total number of likes} + \text{Total number of comments}) / \text{total posts}}{\text{number of followers}} \times 1000$$

3.3 Content and media analysis

Holsti (1969) defines content analysis as a research method to systematically and objectively identify specific message features. Many social media studies (Bonsón et al., 2019; Perea et al., 2021; Torres & Pina, 2001) have used content analysis to compare and analyse published content. This study identifies whether media type and content category generate higher user engagement.

Media types were identified as follows: 'GraphImage' for images, 'GraphVideo' for videos, and 'GraphSidecar' for albums. Only these three categories were used since Instagram stories, which disappear after 24 hours, were excluded (Perea et al., 2021).

In the tourism sector, co-creation is directly linked to the concepts of value creation and experiences (Yang & Mattila, 2016). Experiences are the result of the co-creation process, that is, the

result of the interaction carried out between the parties. Godovykh and Tasci (2020) referred that few definitions reflect a holistic nature of experience. In this vein, several related definitions can be found in the academic literature. Tourism of experiences refers to a market trend related to the economy of experiences and is a more global concept that represents the entire economic system of tourism and its context while the term “tourist experiences” refer specifically to the subject or person, the tourist-consumer and it is considered the experiences of tourists provided by the companies, and not by the destination itself. According to Sugathan and Ranjan (2019), co-creation influences the tourism experience and Campos et al. (2018) identified two overall perspectives on co-creation: from the supply side, an organization/destination perspective and from the demand view, a tourist perspective. Considering the various dimensions studied in the process of co-creating tourism experiences, the authors presented a division into four categories for the purposes of this analysis.

In this context, four content categories were used for coding, as detailed in Table 1: demand (tourists), supply (businesses/firms), supply (destinations), and a holistic view (tourism marketplace). This classification reflects different dimensions of the co-creation process.

Table 1. **Content Types**

Content type Object of co-creation	Post Content
Destination	All references related to the territory (geographical space) and its offer of tourist resources, as examples, among others, natural resources such as beaches, rivers and spots.
Firms	All references related to business and services of tourist companies, such as accommodation, restaurants, entertainment activities, transport, travel distributors, among others.
Holistic	All references with content related to the offer (destination and/or companies) and demand (tourists) at the same time, as well as other players in the tourism system.
Tourist	All references with content related to the perspective of demand, that is, the tourist and that show their consumption preferences, tastes, reasons, way of travelling, with whom, when, among others.

Source: Authors' elaboration, based on Andrade-Cunha et al. (2025)

Certain types of minimally mentioned content in Instagram posts were categorized as "other." The content analysis involved four steps: (1) Sampling: 10,017 posts were analysed. (2) Coding: Content types were defined from previous research, adjusted as needed, and categorized using dictionaries. (3) Content analysis: Posts were analysed and classified automatically in base of the previous codification using R software. (4) Consolidation: Findings were consolidated, and statistical differences calculated.

4. Results

Our findings are shown in relation with the research questions proposed in the introduction section. From the 90 Instagram profiles analysed, the engagement metrics were calculated and summarized in Table 2. The table shows the maximum, average, minimum, and standard deviation of the engagement scores. The maximum engagement score observed was 61.21, indicating that there

were profiles with a high level of interaction from followers, while there were also profiles with lower engagement, with a minimum value of 10.20. Additionally, the average engagement of 26.74 suggests that, overall, the analysed profiles had a moderate level of interaction from their followers. However, the standard deviation of 13.11 reveals significant variability in engagement levels among the profiles.

Table 2. **Content Types**

	Max.	Average	Min.	St. D.
Engagement	61.21	26.74	10.20	13.11

Source: Authors' elaboration

Regarding the number of people that the hotel can accommodate (capacity), the number of stars that the hotel receives (classification), the total number of posts published on Instagram (activity), the number of followers on Instagram (followers) and the level of engagement, there were evident differences between the establishments analysed, as shown in Table 3. The hotel with the largest capacity can accommodate up to 532 tourists, while the smallest has a capacity for only 18 tourists. Regarding the classification of hotels, there are hotels from 1 star to 5 stars, with the average being 3.62 stars (std. = 0.98). The differences were also present on Instagram activity as the most active Instagram account had published 1,268 posts while the least active only 10 posts (average = 3,413; std. = 657.90). The account with the highest audience had 45,860 followers, while the account with the lowest audience had only 33 followers (average = 3,413; std. = 657.90). As a consequence, the level of engagement ranged from 10.20% to 61.21% (average = 26.74%, standard = 13.11%).

Table 3. **Statistical data**

	Maximum	Average	Minimum	Std. Deviation
Capacity in number of person	532	148.15	18	153.68
Classification (number star)	5	3.62	1	0.98
Instagram activity	1,268	257.35	10	297.48
Instagram audience	45,860	3,413	33	657.90
Engagement	61.21	26.74	10.20	13.11

Source: Authors' elaboration

Table 4. **Instagram's presence. Multivariate statistics – Generalised Linear Model (Binomial)**

Independent variable	Dependent variable			
	Instagram's presence			
	Estimate	Std. Error	Z value	Sig.
(Intercept)	0.2437343	0.2114409	1.153	0.025 *
Capacity in number person	0.0008678	0.0005363	1.618	0.110
Classification	0.4307914	0.6019855	0.706	0.042 *
Group	-0.0002379	0.0001910	-1.245	0.217
* Significant at 0.01 < p < 0.05 (2-tailed)				

Source: Authors' elaboration

Table 4 shows the binomial analysis identifying which hotel-related variables better explain Instagram use by hotels. The only significant variable is hotel classification; star-rated hotels are more

likely to have active Instagram accounts. Variables like capacity and hotel group affiliation are not significantly related.

Table 5 examines which hotel characteristics affect Instagram activity levels. The results indicate that only one variable, the hotel's capacity, positively correlates with Instagram posting frequency.

Table 5. Instagram's activity. Multivariate statistics – Generalised Linear Model (Logit)

Independent variable	Dependent variable			
	Instagram's activity			
	Estimate	Std. Error	Z value	Sig.
(Intercept)	9.96009	47.35727	0.210	0.834048
Capacity (number of people)	44.61456	12.69991	3.513	0.00793 **
Classification	42.72595	26.40448	1.618	0.110264
Group	0.02841	0.04273	0.665	0.508294
** Significant at $0.001 < p < 0.01$ (2-tailed)				

Source: Authors' elaboration

Regarding the audience reached by the hotel accounts on Instagram (Table 6.), our results show that the classification variable is the unique to have a positive relationship with the audience.

Table 6. Instagram's audience. Multivariate statistics – Generalised Linear Model (Logit)

Independent variable	Dependent variable			
	Instagram's audience			
	Estimate	Std. Error	Z value	Sig.
(Intercept)	382.251	324.590	1.211	0.230
Capacity in number person	22.482	797.826	0.028	0.978
Classification	1.873	7.880	0.238	0.0313 *
Group	-241.950	168.535	-1.422	0.160
* Significant at $0.01 < p < 0.05$ (2-tailed)				

Source: Authors' elaboration

Lastly, we applied a generalized Linear Model (Logit) to identify variables affecting Instagram engagement for hotel accounts. As shown in Table 7, higher activity levels and hotel capacity negatively impact engagement, while other variables are not significant. Hotels with lower capacity and fewer posts tend to achieve higher engagement.

Table 7. Instagram's engagement. Multivariate statistics – Generalised Linear Model (Logit)

Independent variable	Dependent variable			
	Instagram's engagement			
	Estimate	Std. Error	Z value	Sig.
(Intercept)	36.004	87.906	1.160	0.250239
Activity	-9.935	2.455	-4.046	0.000137 ***

Audience	1.405	3.074	1.046	0.10837
Capacity	-2.472	7.118	-0.347	0.028682 *
Classification	45.268	73.547	0.637	0.526379
Group	-34.819	14.173	-2.236	0.729532
* Significant at $0.01 < p < 0.5$ (2-tailed)				
*** Significant at $0 < p < 0.001$ (2-tailed)				

Source: Authors' elaboration

When analysing the content types of the posts published on the hotels' Instagram accounts (see Table 8), we found that the most popular content fell into the holistic category (32.10 %). The second most commonly used category (26.96 %) covers posts related to tourists. The following favoured category was the content related to destination (22.44 %) and, finally, the content about hotel services (18.50 %).

Table 8. **Percentage of co-creation dimension**

Content type	Percentage
Destination	22.44%
Firms	18.50%
Holistic	32.10%
Tourist	26.96%

Source: Authors' elaboration

The second research question looks at whether different content types generated different levels of engagement. Table 9 shows that the holistic content generated more comments (0.57) while the destination content generated more likes (86.43). As can be observed, these three content types have the highest standard deviation in likes and comments. This might occur because these three content types are quite broad, grouping different sub-topics related to their main content.

Table 9. **Descriptive statistics of content type and engagement**

Content Type		Number of Comments	Number of Likes
Destination	Mean	0.34	86.43
	N	1,430	359,393
	Std. Deviation	1.47	96.47
Firms	Mean	0.53	52.60
	N	1,808	180,300
	Std. Deviation	2.59	65.12
Holistic	Mean	0.57	77.28
	N	3,417	459,576
	Std. Deviation	3.66	187.90
Tourist	Mean	0.30	49.18
	N	1,489	245,694
	Std. Deviation	1.87	97.86

Source: Authors' elaboration

Table 10 shows that the most frequently used media type on Instagram by hotels was pictures (73.97 %), as expected. Nevertheless, 15.90 % of posts were videos and 10.13 % of posts were albums. Both are becoming increasingly common on this platform.

Table 10. **Percentage of Media Type**

Media type	Percentage
Picture	73.97%
Video	15.90%
Album	10.13%

Source: Authors' elaboration

To answer RQ3, the relationship between the media type and the level of engagement is studied. Table 11 depicts statistics regarding media type and user reactions, showing that different media types lead to different levels of engagement. According to the results, pictures received the highest number of comments (0.46) and generated more likes (70.33) than other media types. The album media type received the fewest likes and comments.

Table 11. **Descriptive statistics of media type and citizen reactions**

Media Type		Number of Comments	Number of Likes
Picture	Mean	0.46	70.33
	N	6,356	963,900
	Std. Deviation	2.36	149.54
Album	Mean	0.41	64.47
	N	1,221	189,949
	Std. Deviation	1.68	161.89
Video	Mean	0.31	48.54
	N	576	189,494
	Std. Deviation	1.05	109.14

Source: Authors' elaboration

5. Discussion

As in the previous section, the discussion is presented within the scope of the research questions formulated.

RQ1: Which are the hotel characteristics that affect the use, activity, audience, and engagement on Instagram?

The results obtained show that some establishments had more active interaction with their audience compared to others, although in our opinion, both Instagram activity and audience averages should be much higher. These results demonstrate carelessness in communication and the little importance given to planning interaction and co-creation in the social network. Managers must define which goals should be achieved regarding the levels of engagement and interaction, not only for the establishment but also for the destination.

Regarding the hotel classification as the only significant variable in relation to the Instagram use, the finding is justified on the premise that star-rated hotels must maintain an active presence on social

media platforms, as brands lacking this online presence face a significant risk (Radwan & Radwan 2016). The absence from social media can lead to the spread of assumptions that have the potential to influence brand perception, regardless of their veracity (Jue et al., 2009). This risk is particularly relevant in environments where consumer trust is not firmly established and where potential users have access to a large amount of information about competing services (Brogan & Smith, 2009). Therefore, it is preferable for companies to be present and have, at least, a minimal control over their image on social media than to have no presence at all (Radwan & Radwan, 2016). Additionally, as noted by Garrido-Moreno et al. (2018), the use of social media can contribute to the development of valuable skills based on customer information, as integrating this information enables to personalize services according to customer needs, which will have a positive impact on value creation. This approach can also positively influence hotel performance, as the presence on social media has been observed to be related to the performance of hotels, such as revenue per available room (Kim & Chae, 2018). Thus, hotels should consider social media as a strategic tool for their organizational objectives, such as sales, promotion, and customer service, and seek to increase their capacity to leverage them.

In relation to the hotel characteristics that affect the Instagram activity levels, our results show that hotels with larger capacities tend to publish more posts. This result is in line with previous research (Mallin & Ow-Yong, 2012; Utama, 2012; Bonsón & Bednárová, 2013; Bonsón et al., 2023) that consistently indicates that the size of a company plays a significant role in determining the extent of information disclosure. Larger companies are found to be more inclined to share online information compared to smaller ones, often incorporating web and social media strategies into their business operations (Bonsón et al., 2014). According to Esmark Jones et al. (2022), when the weekly number of publications surpassed 18.24, they began to positively impact hotel occupancy rates. Additionally, the analysis of USA hotels performed by these authors revealed that original publications featuring events such as concerts, festivals, holidays, or non-event-related content accompanied by images had the most positive effect on occupancy, while posts related to food and drink specials, national sports games, or local events resulted in lower occupancy rates.

In addition, we verified that those hotels with the highest number of stars (classification variable) predominate in having the highest number of followers on Instagram (audience). This finding is consistent with Taylor et al. (2015) which revealed that although both upscale and mid-range hotels engaged on social media platforms, their approaches varied. It appears that upscale hotels opted to maintain a social media presence primarily for guest interaction, whereas mid-range hotels utilized platforms like Twitter to drive room sales through promotional offers. Hence, the decision of luxury hotels to participate in social networking was not primarily driven by sales goals but rather by a desire to ensure guest satisfaction by demonstrating attentiveness and accessibility to guests and their needs. This approach seems to offer a practical solution to guest service challenges, as leveraging social media to identify and address immediate concerns can lead to enhanced guest satisfaction.

In relation to achieve higher levels of engagement, focusing on quality over quantity in posts is recommended. Our research indicates a negative correlation between engagement and activity on Instagram. This phenomenon has already been detailed by Perea et al. (2021). The reason behind is the Instagram algorithm, which no longer displays posts in chronological order but rather prioritizes content based on its level of engagement. According to Instagram's official statement (2019), the posts that appear first in users' feeds are determined by factors such as their engagement with specific accounts, the timeliness of posts, the frequency of Instagram usage, the number of accounts followed, and other related factors. Consequently, if the hotel publications fail to generate engagement, such as comments or shares from users, Instagram's organic algorithm will penalize them, resulting in decreased visibility to followers. The algorithm perceives content with low engagement as uninteresting, thus reducing its exposure to followers' feeds over time. On the other hand, the negative association between engagement and capacity stems from the previously analysed positive relationship between capacity and activity.

In relation to whether the hotel belongs or not to a group, both independent hotels and those in groups can achieve higher engagement with effective marketing and communication strategies. The success depends on the quality of content, the posting consistency, the user interaction, the online customer service, and their adaptability to trends. Both types of hotels must understand their audience and use analytics to refine their strategies. The independent hotels benefit from unique identities and flexibility, fostering closer connections with local audiences. In contrast, the hotel groups leverage brand recognition and global reach to engage a broader audience and attract more guests.

RQ2: What is the co-creation dimension posted on Instagram by hotels that generates the highest engagement?

From the results of the content analysis it appears that the most popular content fell into the holistic category of the co-creation process. This result suggests that hotels tend to use their Instagram account as one tool to promote the experience of staying in Porto.

Regarding the second preferred category, posts related to tourists, in order to understand which dimensions of co-creation of experiences should be enhanced, it will be necessary for managers to be able to identify which positioning attributes are most valued by tourists, both for the unit and for the destination, and to integrate these contents in the developed communications. Managers can enhance in the contents, questions about the preferences of the tourists and the attributes of differentiation of the unit and destination to test the level of appreciation of these same attributes.

In relation to the levels of engagement, the holistic content generated more comments while the destination content generated more likes. Posts about Porto seem to attract higher attention (as users react through likes), while posts about the travel experiences generate more comments and discussion. Thus, hotels should challenge the customers to provide further feedback on how to improve their experiences to have more interaction. Nevertheless, it is noteworthy to consider that event announcements may not be enough to capture the attention of a significant number of followers. and encourage them to engage with the content shared in the hospitality industry (Luarn et al. 2015).

RQ3: What is the type of media posted on Instagram by hotels that generates the highest engagement?

The most frequently used media type on Instagram by hotels was pictures and received the highest number of comments and generated more likes than other media types. Thus, hotels should leverage quality images in their publications to obtain more engagement. An explanation for this result could be that videos take longer to be viewed compared to other types of posts (de Vries et al. 2012, Van Der Heide et al. 2012) while statuses and photographs quickly capture people's attention with less effort and in a shorter period of time (Luarn et al. 2015).

The power of social networks to obtain tourist information by users and to influence the decision to purchase services is indisputable. Tourism companies are increasingly paying attention to social networks not only as a source of privileged information collection from their users and customers but also as an instrument capable of influencing tourist purchases and satisfaction. Strengthening close relationships and generating positive interactions that aim to recommend and provide market reach are relevant objectives for the sustainability of hotels. In this sense, the results of this research have very significant practical implications as they help hotels to improve their performance in the market and to take more assertive decisions regarding their presence on Instagram. By applying this analysis methodology, hotels will be able to make a more in-depth diagnosis of the interaction performance with their followers on this social network and will identify which types of content generate the most engagement, interaction and reach, understanding whether this content is enough to influence new potential customers.

By recognizing which types of publications are most attractive to their followers, hotels will enable increased interaction and create opportunities for co-creation with users, creating innovation and personalization of their services. Reinforcing the content that includes photographs of the destination and hotels simultaneously (holistic perspective of co-creation) seems to enhance

engagement and be the best option. As the hotel industry has a very aggressive competitive external environment and is very susceptible to trends, this analysis allows companies to confirm the attributes most valued by Instagram users (mainly young-adult consumer segments) in order to generate more attractive content.

6. Conclusion

This study sought to investigate the content published on social media by companies and the interactions with travellers as an interesting source of unexplored data for the co-creation of experiences in the tourism field. Our work makes a clear contribution to the body of knowledge related to the main theories of value creation, associated with the co-creation of tourism experiences regarding the tourist behavior on Instagram, offering specific theoretical and practical implications based on our empirical findings and discussions provided above.

The innovativeness and theoretical contribution of this research lies in the study of the co-creation of the tourism experience based on Instagram posts. The study does not only focus on a specific tourism service but also seeks to explore the co-creation of the whole experience that a tourist lives in relation to a tourist destination and the accommodations services. Regarding the theoretical framework, this study also provides new insights into how the content uploaded by companies to social media generates higher engagement and contributes to a better understanding of the interactions between accommodation companies with actual and potential tourists helping the former to understand which content is most effective for boosting interaction with tourists, reinforcing the need for engagement between tourists and companies. The more active and greater interaction and engagement, the more favourable the co-creation process may be and, consequently, the probability of tourist satisfaction may also be higher.

Although previous studies have acknowledged experience co-creation as a successful strategy of differentiation against competitors, there is a scarcity of studies dealing with the content published on social media in the tourism sector as a source of valuable data and, in particular, in relation with the engagement generated. This gap is even more notable when considering the study of interactions between tourists, companies and destinations on Instagram.

From a practical view, some of the results of this study can directly inform the social media strategies of tourism companies that use Instagram as a channel of communication with their (potential) customers. They can also contribute to incentivizing co-created content and increasing consumption.

In addition, the findings of this study shed light on some important social impacts connected to various Sustainable Development Goals (SDGs). For instance, providing quality social media training for hotels is crucial. A strong online presence can boost a hotel's visibility and success, which ties into SDG 4 (Quality Education). Also, bigger hotel chains often dominate social media, highlighting the need to level the playing field for smaller businesses to engage effectively in digital marketing and reap its benefits, in line with SDG 10 (Reduced Inequalities). Moreover, the findings stress the importance of investing in digital infrastructure and tech capabilities within the hotel industry. This is key for driving innovation and staying competitive in today's digital world, which supports SDG 9 (Industry, Innovation, and Infrastructure).

Our results show that it is possible to explore the co-creation process through Instagram posts although with some limitations. These limitations are associated, firstly, with the intensity of the activity promoted by companies on Instagram and, secondly, with the multidimensionality of the co-creation process. The analysis shows that tourist accommodation companies still do not work the co-creation of experiences on Instagram and do not give the importance that Instagram deserves, as a precious source of information collection for service innovation, for satisfaction management or for fostering relationships.

This study has several limitations that should be acknowledged. First, the engagement analysis presents constraints in understanding the level of tourist involvement during different phases of their trip: prospecting (before the trip), consumption (during the trip), and reflection (after the trip). To fully address these phases, future research could integrate engagement analysis with data from accommodation reservations and user profiles to uncover more nuanced insights. Second, this research focuses exclusively on Instagram, which excludes comparative insights from other emerging platforms like TikTok. These platforms could offer complementary perspectives and may enrich the understanding of social media dynamics in the tourism sector. Additionally, as noted by Pfeffer et al. (2018), automated tools in OSINT-based methodologies, while useful for processing large datasets, are prone to classification errors, which may impact the accuracy of content analysis and engagement measurements. Addressing this issue through advanced machine learning dictionaries could significantly enhance the precision of future analyses. Finally, this study lacks a longitudinal perspective. A planned, long-term analysis aligned with a marketing calendar could provide deeper insights into seasonal trends and the evolution of digital interactions over time. This would help to uncover changes in co-creation practices and tourist behaviors more effectively.

6.1 Future lines of research

Building on the findings and limitations, future studies could explore several key areas to advance in this field. An important line of research is examining the correlation between engagement levels on social media and business performance metrics such as revenue and customer satisfaction. This could involve analyzing engagement during different phases of the tourist journey and linking these insights to tangible business outcomes. Another promising avenue involves broadening the scope to include cross-platform comparative studies. In this vein, platforms like TikTok, Facebook, or Twitter could provide diverse insights into how content strategies may vary as well as their specific impacts on user engagement.

Future research could also explore integrating engagement analyses across multiple platforms, such as Booking, Trivago, Airbnb, or The Fork. These platforms enable post-consumption evaluations, providing a fuller picture of the co-creation process and its outcomes. Sector-specific studies focusing on restaurants, transport, and entertainment could also offer valuable insights into best practices across different tourism sectors.

From a methodological perspective, developing advanced classification systems based on machine learning could enhance the accuracy of content and engagement analysis. Additionally, longitudinal studies could track changes over time, offering a dynamic view of the co-creation process and its evolution.

Finally, investigating the impact of social media on business performance for small and medium-sized enterprises in tourism could address gaps in how these businesses leverage digital platforms. Understanding the role of each platform in marketing effectiveness and customer loyalty would be particularly beneficial.

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