

Visitors' perceptions of Bucovina on Instagram: which places generate more social media engagement?

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Abstract: Instagram is one of the most influential social media platforms, shaping the way tourists imagine and experience destinations. It is currently used as an instrument for influencing visitor behavior and to increase tourist flows. This paper analyzes the spatial distribution and social media engagement of Instagram posts tagged with the label #discoverbucovina. A number of 6.472 Instagram posts were used to identify the most popular places associated with Bucovina on Instagram, and especially the weight of rural and urban places and heritage in people's posts. Even if Bucovina is well known as a traditional rural destination, the results indicate a strong concentration of the Instagram posts in the most important cities and in several popular rural destinations that gather the main tourist attractions and facilities in the region. The distribution of posts is also linked to accessibility, tourism tradition and specialization. An east-west gradient was observed in the distribution and engagement of Instagram posts, also linked to the relief altitude. As people's posts reflect their perceived importance of places and heritage, further influencing other visitors, this study is particularly relevant for a better capitalization and management of resources in this region, as well as for other rural and nature (mountain)-based destinations.

1. Introduction

As a platform centered around visual engagement, Instagram has become a key resource for understanding how tourists perceive and interact with destination images (Hauser et al., 2022; Zhou & Chen, 2023). Research using Instagram data has already brought valuable insights regarding the differences between a destination's projected image and its perceived image, shaped by tourists' experiences and shared content (Paul i Agusti, 2021a; Wang et al., 2024). All this helps to improve marketing strategies and identify areas that may benefit from targeted promotion (Taberner & Juncà, 2021). Studies analyzing the aesthetic and visual attributes of Instagram posts, have also shed light on the main elements that captivate audiences (Paul i Agusti, 2021b). All the advancements in image analysis have deepened the understanding of tourist behavior and preferences (Wang et al., 2024; Arefieva et al., 2021), providing marketers with strategies to optimize content aligned with the tourists' preferences (Aramendia-Muneta et al., 2021). Overall, combining Instagram data analysis with traditional survey methods offers a more comprehensive view of how tourists cognitively, spatially, and emotionally perceive destinations (Oh, 2022, Adamış & Pınarbaşı, 2022).

The increasing role of Instagram and other social media platforms in the present tourism market has highlighted the need for a deeper understanding of their territorial implications (Palazzo et al., 2021; Kilipiri et al., 2023; Razak & Mansor, 2021). Mapping social media posts and social media-induced travels (Arkema et al., 2021; ElTayeb, 2021; Wang et al., 2024) can uncover patterns of touristification, enabling better approaches for a more sustainable use of local resources (Gon, 2021; Kilipiri et al., 2023). Studies that identify which areas attract more visitors and online engagement and which areas need more attention, can support strategic planning and a more targeted presence of local governance on online platforms (Kilipiri et al., 2023; ElTayeb, 2021; Tran & Rudolf, 2022).

Most of the existing tourism studies using social media data focus on areas from Western Europe or South-East Asia (Cruz-Ruiz et al., 2023; Bhatt & Pickering, 2022), and mainly on urban destinations (Gon, 2021; Paul I Agusti, 2021a; Baek, 2024). Even fewer studies analyzed social media posts in relation with the tourism capitalization of natural resources and natural protected areas (Araujo-Battle et al., 2022; Bergman et al., 2022) and Instagram is more rarely used in these studies (compared to Flickr and Twitter), despite its higher popularity and growth rate. In this context, our study uses spatial approaches and engagement metrics in order to identify spatial patterns in the online representation of tourist heritage for a popular tourist destination in Romania - Bucovina. This region is very famous for its rural and natural authenticity. Given that urban destinations tend to dominate social media content (Gon, 2021), we wanted to identify the weight of rural and urban places and heritage in the Instagram posts associated with Bucovina. As visitors' posts reflect their perceived importance of places and heritage of a destination, this study is particularly relevant for a better capitalization and management of resources in this region, as well as for other rural and nature (mountain)-based destinations.

The paper starts with a review of previous research on this topic and continues with presenting the methodology, results and discussion, ending with conclusions and implications.

2. Literature review

2.1 Social media and tourism

In the last years, we have witnessed a rapid growth and spread of information on social media, through multiple platforms (Zhong et al., 2020), reshaping the way information flows within the tourism sector (Usakli et al., 2017). Besides the sharing of travel experiences (Kladou & Mavragani, 2015), social media platforms such as Facebook, Instagram, or Twitter, have also become a significant part of tourist experiences, often surpassing in importance official information channels (Weismayer et al., 2021; Bhatt & Pickering, 2022; Kladou & Mavragani, 2015).

The main feature of social media is sharing self-made texts, photos and videos, known as User Generated Content (UGC) (Weismayer et al., 2021). UGC is very important in tourism, as sharing unique experiences and photos of landscapes online has become an integral part of the travel experience and planning (Zhong et al., 2020; Martinez-Rolan et al., 2019). On one hand, UGC from social media is often considered a reliable source of information for evaluating tourism products (Xu et al., 2021) and vacation planning (Paul i Agusti, 2021b; Tripathi & Wasan, 2021; Bhatt & Pickering,

2022). Visitors' impressions and reviews are quite persuasive for future visitors, influencing their travel decision (Xu et al., 2021; Eman & Refaie, 2023; Lyn & Rasoolimanesh, 2023). On the other hand, UGC is known to motivate visits and posting about destinations, engaging discussions about them (Hruska & Paskova, 2018). Thus, UGC plays a crucial role in communicating destination image, often outperforming traditional media in this regard (Deng & Liu, 2021).

The importance of social media and UGC for tourism promotion and management has been increasingly recognized (Hysa et al., 2021; Araujo-Batlle et al., 2022; Zhang et al., 2020; Rossi et al., 2018). The visual component of social media is the main responsible for generating online engagement (Araujo-Batlle et al., 2022) and it has a significant tourism impact, as people tend to prefer visual details over textual descriptions when choosing a destination (Weismayer et al., 2021). Thus, taking photos during trips and sharing them online has become a common practice (Peng & Huang, 2017) that significantly shapes the perceived image of the destinations (Go et al., 2020). Online influencers also can play a pivotal role in convincing future tourists to purchase services and visit destinations (Silva & da Costa, 2021). All this considered, social media has practically revolutionized the traditional role of destination marketing organizations (DMOs) by empowering ordinary users to create and promote destination images (Marchi & Raschi, 2022). That's why social media analysis can help tourism organizations in positive brand reinforcement (Abbasi et al., 2023), customer feedback management and strategic tourism planning and marketing (Arabeyyat & Aldweik, 2024).

With the current advancements in technology, geotagged images from Instagram, Flickr, Twitter (X), Facebook, or OpenStreetMap have provided high-quality data for the study of tourists' trajectories, behaviour and preferences for specific attractions (Sun et al., 2013; Gon, 2021; Miah et al., 2017; Peng & Huang, 2017; Rossi et al., 2018; Zhong et al., 2020; Bhatt & Pickering, 2022; Zhou & Chen, 2023; Zhou et al., 2015; Gunter & Onder, 2021). For example, data from Twitter was used to study tourist flows (Gunter & Onder, 2021) and identify less-known tourist attractions (Silaa et al., 2022). Other authors have compared UGC from Instagram with official tourist brochures and travel guides, in order to have a larger perspective on the most visited places from specific areas (Paul i Agusti, 2018).

However, the literature on spatial analysis in tourism and social media still remains limited (Paul i Agusti, 2021a), with Flickr strongly dominating the research of geotagged content (da Mota & Pickering, 2020). Furthermore, most of the existing tourism research is focused on urban destinations, due to their accessibility and concentration of tourist facilities and attractions (Gon, 2021). Flickr images have been used to identify the most visited sites and develop routing recommendation systems in Munich, Germany (Sun et al., 2013), or to identify points of interest, trends, and seasonal visitation patterns in Beijing, Melbourne, Brussels, or Montevideo (Miah et al., 2017; Huai et al., 2021; Peng & Huang, 2017; Paul i Agusti, 2018; Jing et al., 2020). Such studies have underlined the tourists' preference for the city centers (Mou et al., 2020; Huai et al., 2021; Su et al., 2020) as well as for famous cultural landmarks (Jing et al., 2020), shopping and entertainment spots (Su et al., 2020), as well as a significant shift towards green areas before and during the COVID-19 (Baek, 2024). Accessibility is a major factor, as transportation arteries often align with the most visited urban attractions (Hsu et al., 2024). In general, visitation patterns appear to be driven by economic and transport infrastructure, technological innovation, and tourism specialization (Ji & Wang, 2022).

Rural and natural sites, on the other hand, have also increased their popularity, especially among nature-based tourists, agrotourists and eco-tourists (Tenkanen, et al., 2017; Zhao, et al., 2023; Zhou & Chen, 2021; Paul i Agusti, 2021a; Yang et al., 2024; Bento et al., 2022). Studies on nature-based tourism have mostly been using Flickr data, due to the technical limitations associated with Instagram data (Yu & Egger, 2021; Wahler et al., 2023). Some authors compared the projected and perceived destination images based on official websites and Flickr data for Chitwan National Park, in Nepal (Bhatt & Pickering, 2022) or the Grand Canyon (Lee & Tsou, 2018), finding notable

differences between the two. In some cases, geotagged images helped to identify the tourists' perceptions of natural areas, showing an underrepresentation of natural elements (Shi et al., 2021) or unrealistic portrayals of natural sites, as seen in the Philippines (Parris-Piper et al., 2023).

Studies have also shown that protected areas featuring well-known attractions tend to gather more attention from users (Mahmoudi Farahani et al., 2018; Hausmann et al., 2020). However, the rising popularity of natural sites through social media poses both opportunities and risks, as popularity can lead to overcrowding and environmental damage (Bergman et al., 2022). Touristification expands, with more tourists interested in nature activities choosing less crowded paths and more remote areas (Zhao & Wang, 2023). Thus, eco-tourism policies can benefit from social media analysis to monitor public engagement and assess their impact on sustainable tourism development (Firman et al., 2023). Overall, more insight is needed regarding the way rural destinations can effectively use social media for promotion, marketing (Martinez-Rolan et al., 2019) and sustainable management.

2.2 Instagram & tourism research

Instagram is the third worldwide social media platform as per monthly active user count, after Facebook and YouTube (Dixon, 2024), and the fastest growing one, with about a 25.3% growth in 2024 (Statista, 2024) and millions of daily UGC (Deng & Liu, 2021). It is an image-based app strongly associated with the "selfie" trend (Rogers, 2021) and it has a user-friendly interface that allows multiple interactions with other users in the form of sharing photos or videos, viewing, commenting and liking other posts. The visual content is usually emphasized by text and hashtags (i.e. key words or phrases with a "#" sign), which makes them easier to be found and shared with the right audience (Sheldon & Bryant, 2016).

Instagram is the most widely used social media platform for tourism promotion (Iglesias-Sánchez et al., 2020), with the highest engagement rates (Campoverde & Ugalde, 2020). Here, people share their travel experiences (Fatanti & Suyadnya, 2015) and travel agencies share their offers (Iglesias-Sánchez et al., 2020; Palazzo et al., 2021). The use of Instagram influencers has become a popular strategy for tourism and hospitality businesses to reach new audiences, promote destinations (Yetimoğlu & Uğurlu, 2020; Ong & Ito, 2019) and shape people's opinions (Weismayer et al., 2021). All these make Instagram a popular space for informing people about tourist destinations and services (Usakli et al., 2017; Weismayer et al., 2021; Gumpo et al., 2020). Apart from the images that influence the way destinations are perceived, other users' comments (i.e. previous visitors or locals) have a greater impact on travel choices (Sánchez Castellanos & Saiz Aldana, 2022; Tešin et al., 2022).

Considered the most used social media platform in tourism (Araujo-Batlle et al., 2022), especially among the generation Z tourists (Choi et al., 2023), Instagram provides valuable data for tourism research (Weismayer et al., 2021; Zhou & Chen, 2023). It was used to analyze tourist behavior in major cities, highlighting the way visitors navigate and experience destinations. Such studies on Barcelona, Hong Kong, Vienna or Venice, showed the connection between Instagram posts and well-known tourist attractions (Paul i Agustí, 2021a; Zhou & Chen, 2023; Weismayer et al. 2021), major events, or architectural elements (Rossi et al., 2018; Pdgacar & Zizek, 2020), sometimes revealing a city's hidden gems (Gunter & Onder, 2021). Several studies found a strong correlation between the number of posts and the official visitor statistics (Araujo-Batlle et al., 2022; Tenkanen et al., 2017). In general, Instagram engagement is lower in rural and natural destinations (Martinez-Rolan et al., 2019), where tourist activity tends to cluster in places with unique natural or cultural features (Du et al., 2024). Previous research has found different behaviour patterns in the Instagram posts from natural sites. For instance, in Mexico, well-known and accessible sites are hotspots for international tourists, whilst local residents tend to post more about nature and

wildlife (Ghermandi et al. 2020). Lately, the attention to natural areas is increasing with the trend of certain places becoming more "Instagrammable" than others, hence more attractive for visitors (Gon, 2021; Siegel et al., 2023).

The analysis of Instagram engagement metrics such as the number of likes, comments, shares, and followers, provide valuable insights into how users interact with tourism-related content on Instagram (Joshi & Rathod, 2021; Sakas et al., 2022; Kalinić & Vujičić, 2022; Son & Park, 2024; Yu & Egger, 2021). This makes them extremely valuable for tourism marketing strategies: for evaluating campaign performance, identifying influential content and users, and optimizing content for better audience engagement (Kilipiri et al., 2023; Niziaieva et al., 2022; Singgalen, 2024). The sentiment analysis of visitors' posts offers a better understanding of their perceptions and experiences, contributing to customized marketing approaches (Singgalen, 2024; Kalinić & Vujičić, 2022). Furthermore, machine learning and data analytics can predict the users' engagement with Instagram content, supporting more effective and targeted promotion campaigns (Son & Park, 2024; Yu & Egger, 2021). However, many studies on Instagram engagement metrics still lack a spatial research component, overlooking how engagement varies spatially. Conversely, few tourism studies incorporate engagement metrics from social media. This gap highlights a need for integrated research combining engagement metrics and spatial analysis in order to provide a more comprehensive understanding of tourism dynamics and destination popularity.

3. Materials and Methods

For this study, metadata was collected from Instagram, searching for all the posts associated with the hashtag #discoverbucovina, which is the most popular hashtag referring to tourism in the case study area. With the aid of a data scraper software (Apify) we collected 11.211 posts, from which 7.940 were linked to a location, as geotagging is optional on Instagram. For a clearer technical analysis and data interpretation, we focused on the limits of Suceava county, which largely overlap the Romanian tourism destination promoted as Bukovina. After eliminating the posts with locations too far away from this region, only 6.472 posts remained. For these, we collected the location and the number of likes and comments. Data was exported from Google Earth, as Apify doesn't offer coordinates, and we used Excel, PhilCarto and ArcGIS Pro softwares for data processing and mapping.

Kernel Density Estimation (KDE) was done in ArcGIS Pro. This is a non-parametric method for estimating the probability density function of random variables and visualizing patterns and hotspots within a designated area (Nistor et al., 2020; Hsu et al., 2024; Zhou et al., 2015; Peng & Huang, 2017; Lee & Tsou, 2018). It has been used in tourism studies to analyze spatial tourism behavior patterns in several destinations (Nistor et al., 2020, Paul i Agusti, 2021a; Peng & Huang, 2017; Deng & Liu, 2021; Zhou & Chen, 2023) and to identify the most popular attractions or destinations and areas with decreased activity (Huang et al., 2021).

Geotagged social media data has been proven very valuable in analyzing tourism flows and behavior (Lee & Tsou, 2018; Tenkanen et al., 2017) despite its known limitations, such as: not representing all categories of tourists, i.e. those not posting on Instagram (Bhatt & Pickering, 2022); not differentiating between residents and tourists (Paul i Agusti, 2021b), or difficulties linked to the collection and processing of high volumes of online information (Zhou et al., 2015; Paul i Agusti, 2021a).

The case study area for this paper is the tourist region of Bucovina, Romania, which is a tourism marketing product and a popular brand (Coman, 2023; Pitulice, 2024). It is a part of the historical region of Bucovina, which was divided between Romania and Ukraine (part of the Soviet Union at that time) after the Second World War. Given the evolving and sometimes controversial historical limits of Bucovina, we chose to focus our study on the county of Suceava, which largely overlaps this historical area and was promoted as the tourist destination Bucovina in the last two decades. This territory is one of the most popular rural destinations in Romania for both domestic and foreign visitors (560.176 visitors in 2023). It is famous for the authenticity of its natural and cultural heritage, such as mountain and rural landscapes, traditions, gastronomy, rural crafts, and 8 UNESCO labeled monasteries (Craciun et al., 2020, Bahre et al., 2013, Hincu, 2017, Juravle et al., 2016).

3. Results and discussion

3.1. Instagram Popularity: number of posts

In Figures 1 and 2 we can see an obvious concentration of Instagram posts in the main urban centers with tradition in health and mountain tourism, winter sports (e.g. Vatra Dornei, Câmpulung Moldovenesc, Gura Humorului) or cultural tourism (Suceava). These also gather the largest share of tourist flows and facilities within the region, cumulating 59% of the county tourist arrivals and 35% of the county's accommodation units. These are well-known departure points for most of the day trips and hiking trails in the region. With the exception of Suceava city and its periphery, which concentrate more tourist flows (26,7% of tourist arrivals), the eastern part of our study area and some isolated mountain areas from North-West have the lowest number of posts. This east-west opposition suggests that mountain landscapes in general tend to attract more tourists and inspire more Instagram posts because of their visual aesthetic, which is very important for online engagement (Kim & Ko, 2012), but also because they gather many famous tourist attractions (e.g. mountain peaks, hiking trails, sky slopes, UNESCO churches etc.). These findings confirm what previous research on social media has shown: the fact that tourists tend to concentrate around the main tourist attractions (both cultural and natural), shopping and entertainment areas, as well as along the main transport nodes and infrastructure (Zhong et al., 2020; Zhang et al., 2020; Hsu et al., 2024; Ji & Wang, 2022). The main cities align with the main east-west transport axis linking the regions of Moldova and Transylvania, or the North-South axis passing through the frontier customs of Siret and the city of Suceava. The extension of tourist facilities, arrivals and Instagram posts around the main cities is also linked to the main tourist attractions and accessibility; it reflects a typical visiting pattern that favors close attractions or destinations, with many tourists making day trips and sometimes visiting more than planned (Paul i Agusti, 2018).

Several peripheric, recently declared cities that lack a tourist tradition, tourist facilities and major tourist attractions, have no tourist posts: e.g. Solca, Milisauti, Cajvana, Bucecea, Falticeni, and Brosteni. On the contrary, several rural administrative territorial units (ATUs) with major tourist heritage (i.e. UNESCO-labelled monasteries,

well preserved rural landscapes and traditions, museums highlighting local crafts) and more tourist facilities generate a significant number of Instagram posts: e.g. Vatra Moldoviței, Moldovița, Putna, Sucevița, Vama, or Mănăstirea Humorului.

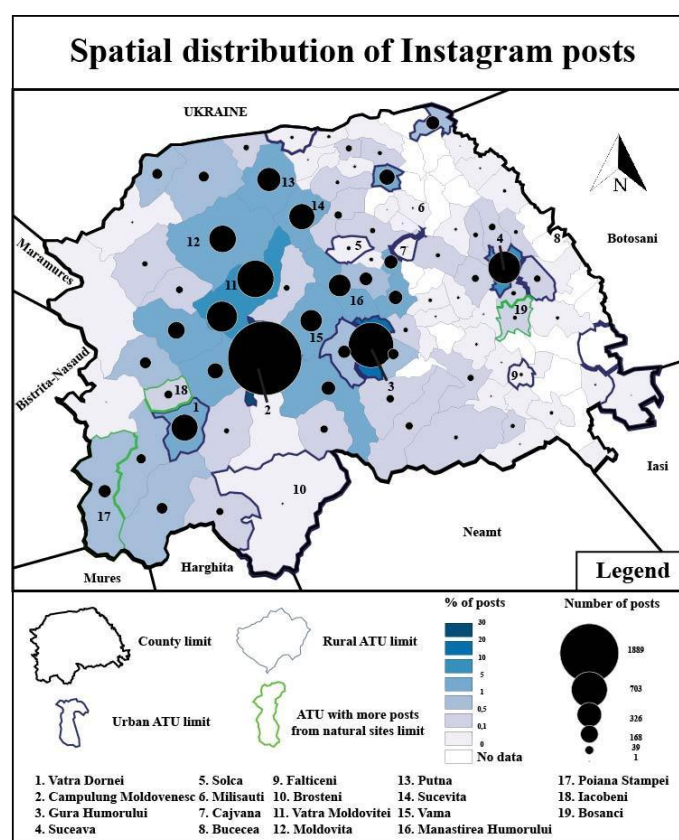


Figure 1. Distribution of Instagram posts and the share of tourist arrivals per ATU (2023)

Looking at the maps, we can say that there is not a strong rural-urban distinction in the Instagram popularity, but rather a west-east and center-periphery differentiation, mainly linked to the distribution of tourist facilities and heritage and consequently, of tourist arrivals. This connection between the number of tourist arrivals and the number of posts on Instagram has been highlighted also in other studies (Araujo-Batlle et al, 2023). Research on several World Heritage Sites in Europe and North America has revealed a direct correlation between Instagram data and official statistics, with World Heritage cities receiving significantly more posts than other types of destinations (Falk & Hagsten, 2021). However, in this paper, the higher number of posts is sometimes linked not only to a major attraction but also to some very active Instagram accounts with many engaging posts, mostly belonging to accommodation units or restaurants. This aspect is important because tourists are known to gravitate toward the most popular sites that usually gather the most of marketing efforts (Paul i Agusti, 2021b).

The same posting pattern appears in the distribution of Instagram posts made from built or natural environment sites. Thus, posts from natural sites dominate only in 3 ATUs (Poiana Stampei, Iacobeni and Bosanci). They are made from iconic tourist places such as Tihuta and Mestecanis Passes (well known for their scenic mountain landscapes) or Tinovul Mare peatbog. This could be linked to a visitor's behavior of posting more

images of iconic sculptures or buildings (Huai et al., 2021), and famous cultural landmarks (Jing et al., 2020), sometimes even from natural environments (Shi et al., 2021). And even in natural sites, the highest tourist densities are usually observed near tourist services (Jedruch et al., 2020).

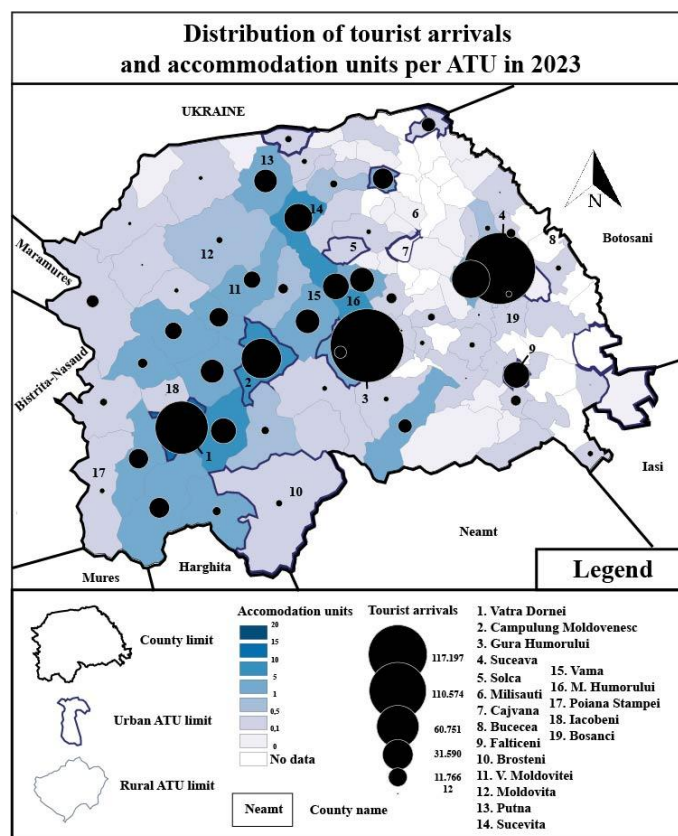


Figure 2. Distribution of tourist arrivals and accommodation units per ATU (2023)

3.2. Instagram appeal: number of likes

Previous studies on geotagged Instagram images showed that the number of likes and comments is a significant measure of online engagement, even more than the volume of shared images (Gunter & Onder, 2021). The main visual factors that generate online attention and engagement are: scenic beautiful landscapes (Kim & Ko, 2012), images underlining destination authenticity (MacKay & Fesenmaier, 2000), images of people engaging with nature or participating in local activities, that create a sense of connection and relatability (Stepchenkova & Morrison, 2006). A second aspect is the narrative and informative content, such as: storytelling (people sharing personal experiences or insights into the destination's history and culture - Brown & Hayes, 2008) or practical information and tips regarding local attractions, itineraries and tourist behavior (Xiang & Gretzel, 2010). Hashtags and location tags can also increase the visibility and impact of posts (Choi & Varian, 2012; Gupta et al., 2020) and collaborating with travel influencers can help reach niche audiences (Audrezet et al., 2020).

In Figure 3, we can see the same east-west gradient in the number and share of likes, in relation with the number of Instagram posts and the concentration of the main tourist attractions, facilities and flows: ten ATUs gather about 75% of the total number

of likes per region. The highest shares of likes per ATU increases from east to west, indicating again that mountain areas tend to inspire more appealing Instagram posts. This time, besides the urban destinations (e.g. Câmpulung - 277.772 likes; Gura Humorului – 95.228 likes), images from some rural ATUs with well-known cultural (religious and rural) heritage gather significantly higher numbers of likes: e.g. Vatra Moldoviței (151.195 likes), Sadova (142.510 likes), or Moldovita (96.270 likes).

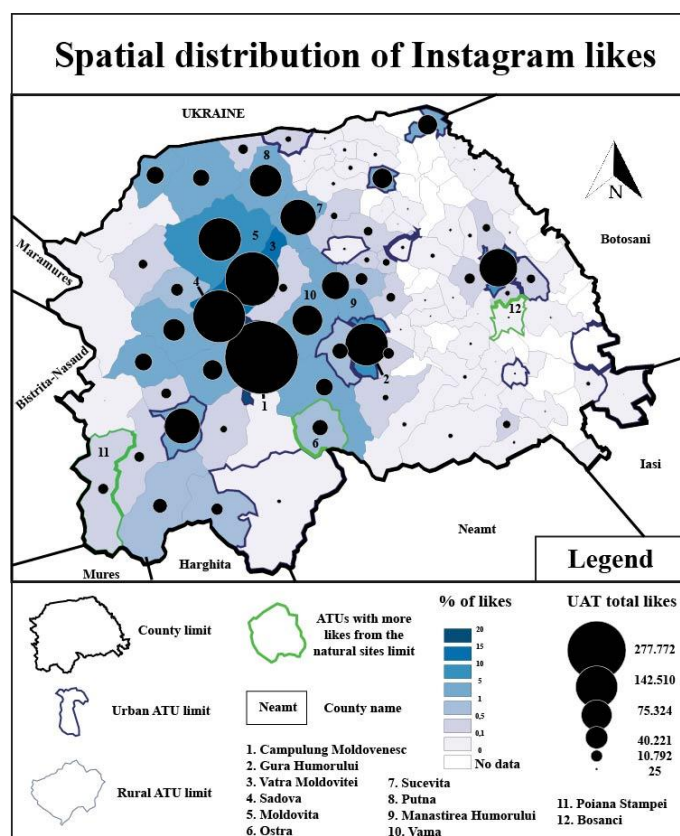


Figure 3. Spatial distribution of Instagram likes per ATU

These higher values for rural areas are supported by higher numbers of likes per post. All posts have at least one like and very few ATUs are more likable than known on Instagram: e.g. Ostra (with images of Tarnita Pass). The most liked posts belong to some artistic photographers' accounts which illustrate high quality images of natural and rural landscapes (e.g. beautiful images of Iezer lake, Rarau and Giumalau Massifs, and Sucevita Monastery) or to popular tourist accounts that promote beautiful images from the region (e.g. bucovina_mea_frumoasa, with images of monasteries, iconic tourist sites, natural and/or rural surroundings from Sucevița, Putna, Vatra Moldoviței, Mănăstirea Humorului, and Vama). This is linked to the fact that in general, posts that provide visually appealing content and useful information about destinations tend to receive higher engagement (Gupta et al., 2020). Other very liked posts belong to accommodation units with an active Instagram account (i.e. an influencer at a hotel in Siret wishing Happy New Year to its followers).

As for the number of likes to posts from natural sites, they dominate only in very few cases, where they are represented again by very beautiful and high-quality photos: such as images of Tinovul Mare peatbog (Poiana Stampei), Rarău Mountains

(Câmpulung), Vatra Dornei, Iezer Lake (Sadova), Palma Pass (Sucevița) or Fânețele Seculare Ponoare (Bosanci). This may also be an effect of the more “instagrammable” sites that attract people’s attention to natural places (Gon, 2021; Siegel et al., 2023).

3.3. Instagram engagement: number of comments

Comments are considered even more important than likes in terms of impact because they indicate the posts’ power to generate dialogue and a sense of community, which can increase the notoriety and appeal of a destination (Brodie et al., 2011). It is known that interesting visual content and comments tend to trigger tourists' interest and decision to visit specific destinations, particularly among the younger tourists (Amir et al, 2022).

Overall, the Instagram posts from the study area generate fewer comments than likes: the whole region gathers 29.950 comments and 1.422.841 likes. We observe a similar concentration of engaging posts within 10 ATUs that gather about 80% of the comments (Figure 4). These are again the most popular destinations from the central-western part of the area (excepting the city of Suceava) and their surroundings: Câmpulung Moldovenesc gathers the maximum number of comments per UAT (i.e. 5.587 comments, 18,7 % of the study area), followed by Putna (15.6%), Vatra Moldoviței (9,8%), Sadova (9%), Gura Humorului (7,2%), Moldovița (5,5%), Suceava (4,6%) and Vatra Dornei (4,3%). These ATUs also gather the most commented posts.

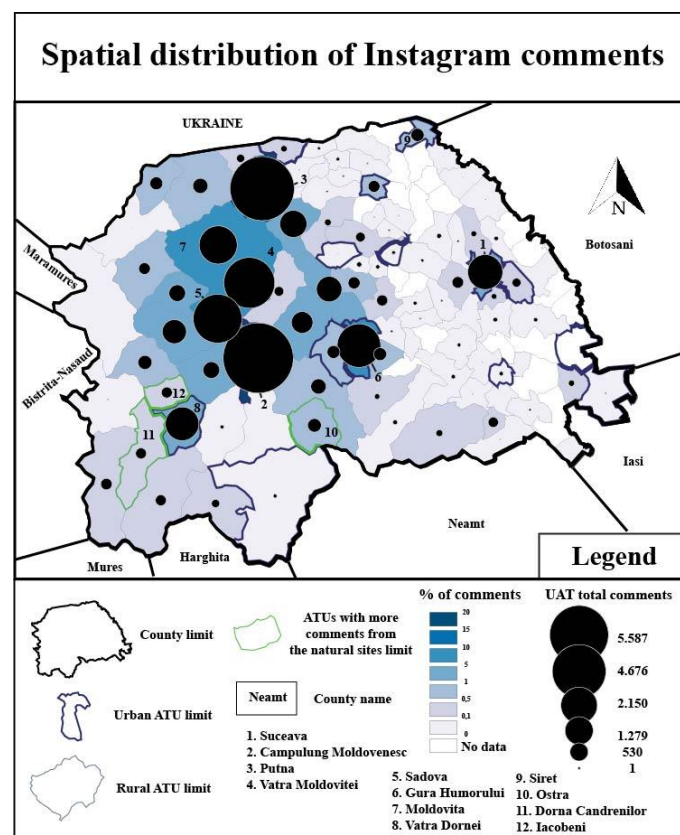


Figure 4. Spatial distribution of Instagram comments per ATUs

The highest numbers of comments per post are recorded in traditional destinations with important tourist heritage or in places with very active Instagram accounts (the city

of Siret – 100 comments). Thus, maximum engagement rates gathered posts linked to prize contests launched by local tourist businesses (in Putna - 3.824 comments or Câmpulung Moldovenesc - 454 comments) or to some travel influencers' posts (Suceava - 144 comments; Siret - 100 comments). As for the rest, most of the posts gather less than 100 comments.

With very few exceptions such as, the Tarnita Pass (Ostra) and Tinovul Mare swamp (Dorna Candrenilor), and Mestecanis Pass (Iacobenii) with 46, 46 and 37 maximum comments per post, natural sites and protected areas in general don't generate many comments.

3.4. Posts density

If we go deeper than UATs, at site level, we can see with more precision the "hot" places that generate most of the posts - Figure 5. Like in other studies (Paul i Agusti, 2021a; Shi et al., 2021, Deng & Liu, 2021; Zhou & Chen, 2023), KDE helps to uncover visiting and illustrating patterns within our study area. Apart from the same concentration in the main urban destinations, we can see clearer the "hottest" places. These have important cultural (rural) and natural (mountain) attractions, and they are easily accessible: e.g. Breaza, Măgura, Argel, Râșca, Moldovița, Paltinu, Prisaca Dornei, Molid, Putna, Sucevița, or Mănăstirea Humorului.

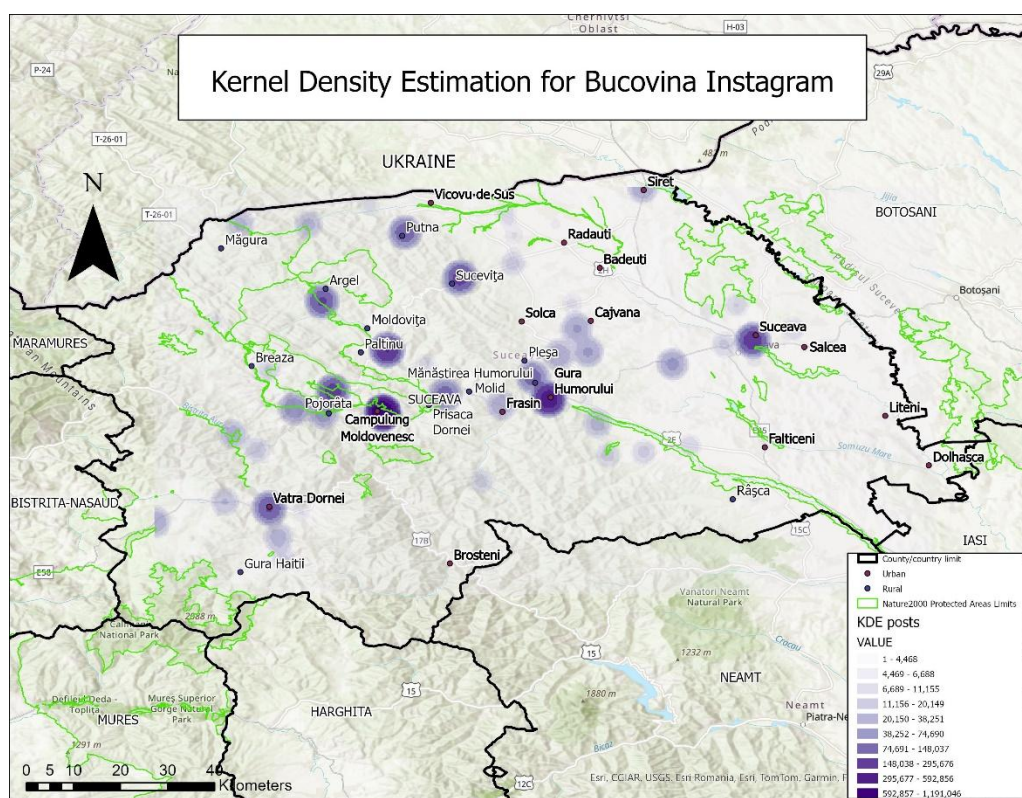


Figure 5. Spatial distribution of Instagram posts (Kernel Density)

We can also see that people don't often post content featuring natural protected areas (only 13,6 % of the regional amount of Instagram posts), especially for those more isolated and/or without famous tourist attractions. That's the case of the central

part of Bistrița Aurie area, Șarul Dornei peatbog, some sites along Moldova river, Suceava river, Liteni or Pătrăuți Forest – Table 1. The exceptions are natural areas located near major urban destinations, easily accessible and with well-known attractions, such as Rarău and Giumalău Mountains (with 11% of all the posts from natural areas), the borders of Obcinele Bucovinei, or Upper Moldova River. This reinforces findings from previous studies showing the importance of well-known attractions in generating more online interest for protected areas (Mahmoudi Farahani et al., 2018; Hausmann et al., 2020).

Table 1. The Nature2000 sites within the study area.

Protected Area Name	Nature2000 Site Code	Total posts	Maximum number of likes	Maximum number of comments
Rarău-Giumalău Mountains	ROSPA0083	746	2251	73
Rarău-Giumalău Habitats	ROSAC0212	693	2251	73
The Bucovina Highlands	ROSCI0328	46	18474	69
Upper part of Moldova River	ROSAC0321	41	2047	46
Moldova River between Păltinoasa and Ruși	ROSAC0365	34	484	18
Feredeului Highlands	ROSPA0089	10	18474	69
Găina-Lucina Habitat	ROSAC0086	4	403	10
Călimani-Gurghiu Habitats	ROSCI0019	4	206	4
Ponoare Ancient Hayfields	ROSAC0082	4	197	8
Tinovul Mare peatbog - Poiana Stampei	ROSAC0247	2	49	0
Călimani Mountains	ROSPA0133	1	206	4
Pătrăuți Forest	ROSCI0075	1	118	0

Accessibility, tourist facilities and notoriety could partially explain the strong differences in popularity of Rarău-Giumalău Mountains (well known for mountain hikes, winter sports and religious sites), compared to Călimani Mountains, with a major natural heritage and iconic attractions but with only 1 Instagram geolocated post. Other areas such as Tinovul Mare (Poiana Stampei), Fanetele Seculare Ponoare are less known in general, hence their very weak presence on Instagram. Other studies using KDE confirm this aspect, showing that the highest tourist densities in natural sites are usually near tourist services (Jedruch et al., 2020) or linked to transport infrastructure and tourism specialization (Ji & Wang, 2022). In our case study region, it is health tourism, winter sports and mountain hiking that generate the highest concentrations around three main hotspots situated in the mountain area (Vatra Dornei, Câmpulung and Gura Humorului), with the city of Suceava in an eccentric position and with mostly cultural attractions (a UNESCO church, a fortress, events and museums). The other concentrations (Moldovita, Manastirea Humorului, Sucevita, Putna, Pojorita) are based on rural (traditions, gastronomy) and/or UNESCO cultural heritage. Very few are only attractive because of

their natural landscapes and presence of tourist facilities (e.g. Magura, Gura Haitii). The underrepresentation of important natural heritage sites (such as Calimani Mountains or Tinovul Mare swamp) could indicate the absence or less efficient promotion strategies.

5. Conclusions

This study brings new evidence to the existing literature regarding tourism, social media and destination image. We aimed to identify patterns of representation of different types of heritage (i.e. urban or rural, natural or cultural) in people's Instagram posts linked to one of the most famous Romanian destinations. The paper highlights several important aspects of interest for the academic research regarding destination image and tourist promotion, especially for practitioners.

Even if Bucovina was built and promoted as an iconic rural tourism destination, with authentic cultural and natural heritage (Hincu, 2017, Chasovschi et al., 2011, Cioban, 2022), there is not necessarily the urban or rural feature of places that differentiates the number of posts and engagement level on Instagram, but it is rather the place fame, its tourist tradition and specialization as well as the localization of tourist services and infrastructures (accommodation, transport, sports, health centers etc) that make the difference. This reinforces similar research findings from other countries (Zhong et al., 2020; Zhang et al., 2020; Falk & Hagsten, 2021). Furthermore, the main Instagram hotspots identified largely overlap the most visited places in the study region, confirming the connection between the number of Instagram posts and tourism flows (Araujo-Battle et al, 2023), as tourists are usually attracted towards the most popular sites (Paul i Agusti, 2021a). However, in some cases, we observed that online popularity is influenced by some accommodation units or restaurants with very active Instagram accounts and many engaging posts.

The results indicated an east-west gradient in the number and engagement level of Instagram posts, which seems to be connected to the change in landscape (with mountain areas gathering more posts and likes on Instagram) and the main transport axis crossing the region. The aesthetic appeal of mountain landscapes and their diverse tourist offer (catering for winter sports, for health, mountain, cultural and rural tourism, and gathering most of the tourist facilities) explains this spatial differentiation. Using GIS and geolocated data allowed a clearer representation of the spatial distribution of Instagram hotspots. This further reinforced the strong impact of the tourist fame and tourist tradition of destinations on visitors' travel choices and Instagram posts: it explains the underrepresentation of some localities with less promoted UNESCO heritage (such as Patrauti or Arbore), of many natural protected areas or regions with significant natural heritage, but less promoted on Instagram (e.g. Poiana Stampei peatbog) and/or less accessible (e.g. Calimani Mountains and the north-western part of the region).

All these point out clearly areas that need a lot more attention and creativity from local DMOs as regards their tourist promotion and capitalization: the eastern part of the study region that could focus more on developing a tourism offer based on a cultural and rural heritage network (i.e. churches, history, rural traditions and gastronomy, as well as business tourism facilities); the more isolated (peripheral) mountain areas, with significant natural heritage, that need more online promotion of their main attractions

and better preserved authenticity, as well as the development of more tourist trails (for mountain hikes and/or cultural heritage). Their future promotion could benefit more from the current growth in interest for nature-based tourism, rural destinations and sustainable tourism, both within and outside Instagram. Social media platforms and Instagram in particular, play an essential role in shaping the narrative around sustainable tourism (Cruz-Ruiz et al., 2023) and there is a growing trend of Instagram influencers that post about/from rural or natural destinations associated with sustainable tourism, raising awareness about those places and this topic (Palazzo et al, 2021; Kilipiri et al., 2023; Firman et al., 2023). We saw that some of the most commented posts in our study were from influencers. Therefore, an efficient and targeted promotion strategy on Instagram and other social media platforms could enhance the promotion and development of the less visited natural areas as sustainable (ecotourism) tourism destinations. Further targeted research could better support their integration into the present tourist itineraries.

The most liked and engaging posts are usually those featuring high quality images of beautiful natural landscapes or famous cultural attractions. However, the most commented posts are not linked to the value of the heritage they illustrate, but rather to the fame of the place (i.e. post from Rarau Massif) or to individual promotion strategies of various tourist businesses (i.e. online competitions with prizes) and professional photographers. This aspect can be capitalized by local DMOs in the sharing of more frequent, more appealing and more engaging content on social media, in order to attract visitors, keep them interested and even build online communities (e.g. communities based on destination choices and/or niche forms of tourism) and professional photographers could be involved. Following online engagement metrics (i.e. likes, comments and shares) would help DMOs and tourism businesses to evaluate and adapt their strategies for greater impact (Adwan et al., 2023). They can stay in contact with their visitors' needs and interest level, and maintain their loyalty. Being present on both traditional and social media communication platforms, they can target different types of visitors, with better tailored content. As smartphone users are known to travel predominantly in areas suggested by recognized authorities (Lee & Tsou, 2018) and to visit photo-spots (Lee & Tsou, 2018), a more effective social media communication can provide better, up to date information about potential destinations and tourist facilities. This could raise awareness about the ecological or cultural value of specific places and promote more sustainable tourist behavior. Thus, tourists can be influenced in adopting sustainable visiting practices, in appreciating more the natural heritage of a destination. Through social media promotion, tourist flows can be directed towards less known places, for a better tourist capitalization and a better management of the tourist pressure on destination.

The recent rise of influencers' posts about/from rural destinations associated with sustainable tourism, increasing the awareness about places and this topic (Palazzo et al, 2021) can be capitalized especially by rural and natural sites. Given their recognized role in reaching new audiences (Yetimoğlu & Uğurlu, 2020; Ong & Ito, 2019) and convincing tourists to visit specific destinations (Silva & da Costa, 2021), the right selection of

Instagram influencers could help the less known and less visited areas to raise their perceived value, their tourist appeal and popularity.

Research limitations. The availability of social media data for free (da Mota & Pickering, 2020) makes them more cost-effective for tourism studies (Zhang et al., 2020), and their power to foster communication and engagement grants them marketing effectiveness (Shawky et al., 2019). However, as we mentioned in the methodology section, Instagram data has the bias of overrepresenting the groups of people that are active online and specifically on this platform. And even if we don't know exactly which posts belong to tourists and which to local residents, they are important in shaping destination image and travel behavior. There are also some limitations linked to the platform or to the short and unstructured format of Instagram data, that must be taken into consideration, such as: large amounts of information, subjectivity (e.g. subjective spatial representations of a tourist destination), diversity (e.g. professional and amateur accounts), anonymity (e.g. lack of more data about the account) and reliability.

Future research directions may include a further exploration of the identified spatial patterns in relation with the meanings and emotions associated with specific places, through a content and sentiment analysis of Instagram posts. Going even further, a comparison of results from various social media platforms could expand the overall destination image projected, bringing new insights for a future social media promotion strategy for this area.

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