

# Keeping up with the drones! Techno-social dimensions of tourist drone videography

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## Abstract

Tourists are increasingly using drones on vacation, but how they use them and the nature of the videos that they produce are not well understood. Conceptual advances in the study of tourist videography have produced a new model of these practices which is applied here to explain the nature of tourist videography with drones. An international sample of 351 vacation drone videos was subjected to content analysis, and an analysis of their metadata. The results show a significant variation in the content, technological and social practice of production of vacation drone videos depending on the type of video creator and establish that analysing the videos from the perspective of videography generates insights that are of value to destination management organisations and tourist businesses. It is concluded that city destination management organisations should see vacation drone videos as a new type of user-generated content for their destinations, as well as a potential source of innovative marketing ideas, and that they should engage more proactively with vacation drone videographers to maximise the impact of this opportunity.

**Keywords:** Drone; tourist videography; destination management; marketing; visual turn; user generated content

## 1. Introduction

Tourists have always been eager to use newly introduced technologies to capture their experiences (Anaya and Lehto, 2020). With the advent of Web 2.0 and the omnipresence of smartphones and smart environments (Wang et al., 2021), documenting tourist experiences (taking photos and recording videos) and sharing these on general social media and on specialist travel platforms, has become a standard travel behaviour for many people (Stylianou-Lambert 2012; Jovanović et al. 2019). Separately from traditional tourist photography, and due to its specificity in technological and social practices, tourism videography has emerged as a separate media form and travel-related activity (Dinhopl and Gretzel, 2015; Dinhopl and Gretzel, 2016b). Further, with the rapid advancement of mobile-phones and digital cameras, tourists are now equipped with powerful tools which require more knowledge and skills to use well, leading to device-based specializations, such as *GoPro* cameras (Dinhopl and Gretzel 2016c; Vannini and Stewart 2017). Another type of device that is gaining prominence in tourist videography is drones, which allow tourists to break terrestrial limitations, and the constraints of eye-level perspectives, to get a wider picture of a destination and to add new dimensions to the recording of their experiences. This paper explores the anatomy of drone videos taken during vacations by tourists.

The term 'drone' is used in a very broad way to refer to any type of unmanned aerial vehicle (UAV) that is either pre-programmed to fly, or which is controlled remotely by its user (Vergouw et

al. 2016). Drones can be controlled by apps, on smartphones or tablets, or controlled from more sophisticated base-stations, and they are frequently equipped with cameras and other hardware to allow for the live-streaming and recording of their flights (King, 2014). Indeed, using drones during vacations is becoming a popular leisure activity which is reflected in the large number of drone videos which are uploaded and shared on social media every day (Innga 2016; Fabola et al. 2018; Stankov et al. 2019a).

When compared to the use of other traveller-facing technologies, making drone videos is a relatively complex activity, since it requires more active engagement in trip preparation, activities during the trip, and later in the video processing phase (Stankov et al. 2019b). Along with the obvious shift in perspective, there are several technical and social specificities that drone filming has brought to tourist videography. For instance, it has allowed amateurs to access previously un-shootable locations and videos can now be enhanced with recordings that use different kinds of sensors, making them more useful for various purposes (for example making maps or 3D renderings) (Stankov et al. 2019b). Consequently, a new genre in aerial filming has emerged (Johnson 2016). At the same time, consumers making videos with drones face various regulatory limitations (e.g., no-flight zones, limitations on operating a drone over densely populated areas or large groups of people, ethical and privacy issues) and technical difficulties (e.g., flight time limitations, necessary flight conditions, the need to maintain visual contact between pilot and a drone) (Nelson et al. 2019; Kim, 2020; Kreps 2016; Luppicini and So 2016).

Importantly, in a similar way to other specialist devices, the emergence of drones has also led to the creation of online communities of amateurs, professionals and expert authorities (Coleman et al. 2009) which are grouped around the need for additional expertise, and the desire to showcase or watch the drone videos of others. Apart from tourists who use drones irregularly on vacations, two significant groups of creators can also be seen in these communities – influencers and professional drone pilots. Influencers emerged as a consequence of social media development, and as trendsetters, many have embraced drone video making to attract more followers and to amplify the reach of their work (Femenia-Serra and Gretzel 2020). In most cases, they derive direct financial interests from filming drone videos in a particular destination, but the destination image projections from their videos usually resemble user-generated content by focusing on a storytelling approach, rather than professional videos produced by official destination management organisations or tourism firms (Tiago et al. 2019). Drone filming experts employ drones as their main profession and they usually carry drones on vacation to create videos, mainly intending to showcase their professional skills and work, and they do this without formal support from DMOs or businesses. In essence, they produce professional-style videos that are free for destinations, but which also are independent of the desired image the destination wants to project (Stankov et al. 2019b).

Despite the recent spike of destination drone videos created by consumers (tourists, influencers, and drone professionals), there is very little information on the technical and social practices that constitute this genre of tourist videography (Stankov and Vujičić, 2022). This exploratory research had two aims. Firstly, based on recent conceptual advances in the understanding of tourist videography, to test several measurable variables to determine the technical and social dimensions of drone vacation videos. Secondly, to explore the differences between videos produced by the three most common types of drone vacation video creators. This study situates tourist drone videography within the context of destination management and marketing and pinpoints the main areas for further theoretical and practical research in this emerging field.

## 2. Research background

### 2.1 *The roles of drones in tourism*

As an emerging technology, drones have begun to penetrate many areas of society, including public safety, news reporting, the military, agriculture, and many different industrial settings (Canis, 2015; Sandvik & Lohne, 2014), including tourism. The consumer market for drones can be broken down in two ways. First, by the configuration of the drone as either fixed wing, rotary bladed, or as a hybrid type of the two. Of these, the rotary blade type is by far the most prevalent (GMI, 2018). An alternative categorisation is by the way in which the drone is intended to be used. This splits consumer drones into: aerial photography drones; toy drones; FPV (first person view) and racing drones, and hobbyist/hacker/developer drones (DroneDlyers, 2015). The commercial drone market is estimated to be worth between \$3.45bn and \$5bn (TBRC, 2020; Business Insider, 2020) and despite forecasts of some shrinkage during 2020 due to the COVID-19 pandemic, this market is expected to grow at a CAGR of 19.09% by 2023 (TBRC, 2020). It is predicted that by 2023, the market for commercial drones will be worth \$14.3bn, with 32% of sales in North America, 29% in the Asia Pacific region and 23% in Europe (Commercial Drone Professional, 2020).

Research into the use of drones in tourism, and especially by tourists themselves, is limited but increasing in scope. Hay (2016) carried out the first study undertaken to classify the use of drones in tourism and hospitality and concluded that tourists had a more advanced understanding of the potential uses of drones than tourism businesses. However, most research has focused on the commercial rather than consumer use of drones in tourism (Donaire et al., 2020). For example, Stankov et al. (2019) presented two main scenarios in which drones are impacting on the tourism industry. The first of these is the use of drones to provide services to tourists such as tour guiding, delivery or leisure activities (Fabola et al., 2017; Hwang et al., 2019). The second involves using drones to capture images or data through photography, video or sensors, that can be used for the management and marketing of tourist destinations. DMOs have begun to make greater use of drone technology, with an early example being the way in which New Zealand's DMO used drones to launch its successful 'ultimate holiday selfies' campaign (Dinhopl & Gretzel, 2015; Tourism New Zealand, 2015). In the context of the COVID-19 pandemic, destination managers have also begun to use drones to spray aerial disinfectants, broadcast public health messages, and monitor the size and behaviour of tourist crowds on beaches (Zeng et al., 2020).

Tourists who create drone videos are able to make use of cutting-edge technology to create sophisticated professional quality videos of destinations and attractions (Mirk & Hlvacs, 2014, 2015). For example, virtual reality goggles are now frequently sold alongside high-end consumer drones for the direct streaming of live imagery from flights, allowing for the simultaneous capturing, control and editing of video (Garrett, 2017), and emphasizing the novel experiential immediacy (Laurier, 2015) associated with drones in tourist videography. It is not only amateur drone footage taken on holiday that is having an impact on the tourism industry. Influencers, as an important new channel in digital tourism marketing (Xu & Pratt, 2018), are another way that drone video content for tourism destinations and attractions is produced, with large numbers of influencers promoting themselves specifically in this field (Influence, 2020). In addition, professional drone pilots can often shoot videos whilst on vacation, helping to promote their work through the inclusion of new and dramatic

content. The use of drones on vacation is something that remains subject to a number of international and national legislative and regulative frameworks, which mostly relate to their use within restricted areas such as urban centres and sensitive locations, and their general safety, including their airspace interactions (e.g., CAA, 2019; ECA, 2019; ICAO, 2017). The restrictions on their use during travel experiences, and the specialist nature of the technical knowledge that is required to operate them, further cements them within the elaborate practices of videography, rather than the more casual nature of tourism photography (Dinhopl & Gretzel, 2016).

## ***2.2 Dimensions of drone tourist videography***

The tourist gaze (Urry, 1990; Urry & Larsen, 2011) has become increasingly mediated through the consumption and creation of images, accompanied by the growth of digital technologies and social media (Jansson, 2002; Gretzel, 2018). The images that tourists create on holiday, and the ways that they then share these with others has been the focus of research into tourist behaviour (Lo et al., 2011) and tourism experiences (Walsh et al., 2019), primarily with a focus on photography (Garrod, 2009; Larsen, 2005; Li et al., 2019). Photography, already considered a core part of the tourist experience, has become increasingly commonplace as a part of travel, as it has in everyday life, thanks to the near ubiquity of camera-enabled smartphones (Kim et al., 2014; Wang et al., 2012; Wang et al., 2016). Only more recently has attention been given to the videographic practices of tourists as a distinct area of research, which makes use of specific technology (Dinhopl & Gretzel, 2016; Haanpää et al., 2019; Vannini & Stewart, 2017). However, despite frequent calls for researchers to make use of both tourist- and researcher-created videos to develop new knowledge about tourist behaviours and experiences (Feighey, 2003; Griffin, 2019; Laurier, 2015; Rakic & Chambers, 2009), insights regarding the technological and social dimensions of videography remain scarce. Tourist videography is a set of consumer practices that is distinct from photography in several ways. Dinhopl and Gretzel (2016) conceptualised these differences in terms of technology dimensions, social practices and experience mediation.

### ***2.2.1 Technological dimension***

When comparing to tourist photography technological differences are firstly that video allows tourists to (re)present a visually continuous experience, rather than a snapshot. For this reason, videography is not understood as including the very short videos of the kind that are frequently shared by tourists on Instagram or TikTok (Mukhina et al., 2017; Taylor, 2020), which are better understood from the perspective of photography. Video also allows for the integration of multiple cues to convey meaning, such as voice-overs, music and sub-titles, as well as non-diegetic sound (Smith, 2009). In addition, videography permits the capture of motion (Haanpää et al., 2019), in a way that a still photograph can only imply, and the use of new perspectives on its subject, such as those offered by wearable technology and drones (Stankov et al., 2019).

### ***2.2.2 Social dimension***

The second set of differences between tourist videography and photography are explained by Dinhopl and Gretzel (2016) as being concerned with the social practices of representation associated with each medium. For instance, the nature of editing associated with video and photo is very different, both in

terms of the technology used and presentation of the finished product, as well as the inherent need for editing in the production of video that aims to create representations of a continuous experience. Tourist videos require editing, and there is a social expectation that high quality videos that are shared with other people will feature skilful editing techniques, as the modern ritual of sharing holiday images with friends develops in line with the emergence of new technologies (Laurier, 2015; Nicholson et al., 2002). This editing results in the creation of composite experiences that can integrate moments captured over time, with the connections between them highlighted in the video production process. Related to this is the concept of ‘digital distance’ (Dinhopl & Gretzel 2016: p. 401). Photography frequently aims to capture a sense of immediacy and of ‘being there’ (Li et al., 2019). Although this can be the focus of video in some forms (for example, in a documentary), the widespread availability of digital editing software and the prevalence of storytelling narratives in video means that a greater sense of digital distance from a live event is expected by video audiences. Additionally, in terms of social practices, the ability to capture the interactions of tourists and the dynamic aspects of their experiences (Griffin, 2019), helps to distinguish tourist videography from the snapshot content of tourist photography (Stylianou-Lambert, 2012).

### ***2.2.3 Mediation dimension***

The final area of distinction between tourist videography and photography explained by Dinhopl & Gretzel (2016) is that of mediation. Photographic practices create an intermediary layer between the experience and its representation, for both the tourist taking the photo and looking through a device, and for the later viewers of the photo who see a two-dimensional representation of a vivid experience and have to carry out the imaginative work of re-creating it (Lo & McKercher, 2015). Contemporary videography, however, can utilise unobtrusive recording devices that help the tourist to remain immersed in the experience (Vannini & Stewart, 2017). The tourist experience always contains elements of performativity, as tourists create and recreate social identities on the move (de Souza Bisto, 2016; Larsen, 2005), and traditional photography interrupts these performances by asking participants to pose and adopt particular roles of interest or value to the photographer. In contrast, the ‘always-on’ nature of videography, opens up the possibilities for capturing the ‘ongoing stylised performativity’ of tourists (Dinhopl & Gretzel, 2016: p. 404) and integrating this into the narrative created for the final video. The final aspect of mediation considered by Dinhopl & Gretzel (2016) is the way in which videography can collapse the linearity of the tourist experience. Tourists who plan to engage in videography during their trips will frequently consider this at the planning and destination choice stages of their vacations, as well as during their trips and on return, during the editing process, and finally when sharing their productions. The persistence of videography practices throughout the different stages (Fotis et al., 2012) of holiday experiences collapses the boundaries between different stages of the experiences, in particular blending experience and documentation (Belk et al, 2011; Hillman, 2017).

## **3. Methodology**

### ***3.1. Data gathering***

To obtain relevant videos for analysis, i.e., videos created by individuals during vacations, the automatic video scraping software *Webometric Analyst* (<http://lexiurl.wlv.ac.uk/>) was used to retrieve links to *YouTube* drone vacation videos. *YouTube* was chosen as it currently represents the largest

collection of videos for the promotion of destinations from the viewpoint of users, destination marketing organizations, and influencers (Tiago et al. 2019). Several combinations of keywords were tested to search for videos (drone + vacation, drone + travel, drone + trip, etc.), and the combination of “drone vacation” returned the highest number of potentially relevant videos – 630. The same software was then used to download metadata for the channels on *YouTube* for the creators of these videos and *YouTube Statistics*, an open-source software application was used to collect the metadata for the *YouTube* videos.

### 3.2. Content analysis

A content analysis of all videos and their metadata was then carried out to reconfirm that all videos were created during a vacation. Next, a working classification of drone vacation creator types was developed (section 2) and this was used to classify the videos into groups (Table 1), determined based on the judgement of three analysts and an examination of the creators’ *YouTube* channel videos and the information with them which were characteristic indicators of a channel type. For example, professional drone pilots and influencers had links to their websites or other social media accounts, while tourists did not. Three analysts separately observed the *YouTube* channels and applied the creator classification. In the case of a mismatch in judgment, all three analysts had to agree on the most appropriate creator type to assign.

**Table 1 .** Distribution of vacation drone video creator types in the sample

Creator	Description	Frequency	Percent
Tourists	Use drone primarily for entertainment and sharing tourist experiences, with no financial interest. Typically have a low number of subscribers compared to influencers and professional drone pilots.	177	50.4
Influencers	Use drones to enhance video presentation of a destination; usually have a financial interest, either related to the destination or to promote other products. Typically have the highest number of subscribers when compared to tourists and professional drone pilots.	87	24.8
Professional drone pilots	Use vacations to showcase their main profession without financial interest related to the destination; the number of subscribers varies.	87	24.8
Total		351	100.0

After the initial data check, 351 videos remained. Most of the excluded videos were professionally created by destination management organizations or other travel companies, while some were related to tutorials on how to make drone videos during vacations.

The next step was a video content analysis based on quantified dimensions of the technological and social practices of travel videography, inspired by the work of Dinhopl and Gretzel (2015; 2016b) (section 2.2). Measurable indicators were developed based on the observation of both the technological dimensions of representation in vacation drone videos and of the social practices involved in their production and presentation (Table 2). The data that were used did not allow the research team to determine how the use of drones to record videos on a vacation mediates and influences tourist experiences. Hence, this study only implicitly covers items of the dimension of the mediation of travel experiences. For example, drone piloting disrupts immersion in the experience in contrast to unobstructive equipment-mounted video-technology, but at the same time it creates a new

type of engagement and interaction with the digital screen for the pilot. Thus, this item can be traced through type of filming techniques, that are placed in the technological dimension or through the activity featured in a video, which is within the social dimension. Similarly to the previous procedure, the three analysts observed all videos and assigned appropriate values to measurable variables, agreeing on a value when a mismatch appeared.

**Table 2.** Technological/social dimensions of drone vacation videos with measurable variables

The technological dimension of representation		
Conceptual dimension	Measurable variables	Values
(I) Visual continuity and time	Vacation segments	<ul style="list-style-type: none"> <li>▪ One segment</li> <li>▪ Multiple segments</li> </ul>
	Time manipulations	<ul style="list-style-type: none"> <li>▪ Time is expanded</li> <li>▪ Real-time</li> <li>▪ Time is compressed</li> <li>▪ A mix of real-time and time manipulations</li> </ul>
(II) Multiplicity of cues	Audio processing	<ul style="list-style-type: none"> <li>▪ Narration</li> <li>▪ Music</li> <li>▪ Narration with music</li> <li>▪ Real-time audio (<i>sounds of nature or drone noise</i>)</li> </ul>
(III) Motion	Drone motion	<ul style="list-style-type: none"> <li>▪ Drone taking off</li> <li>▪ Drone landing</li> <li>▪ Both available</li> <li>▪ None of the above</li> </ul>
(IV) Perspective	Filming techniques	<ul style="list-style-type: none"> <li>▪ Reveal Shot</li> <li>▪ Bird's eye</li> <li>▪ Aerial Pan Shot</li> <li>▪ Fly Over/ Trough</li> <li>▪ Tracking Shot</li> <li>▪ Pull back shot</li> <li>▪ Crane shot</li> </ul>

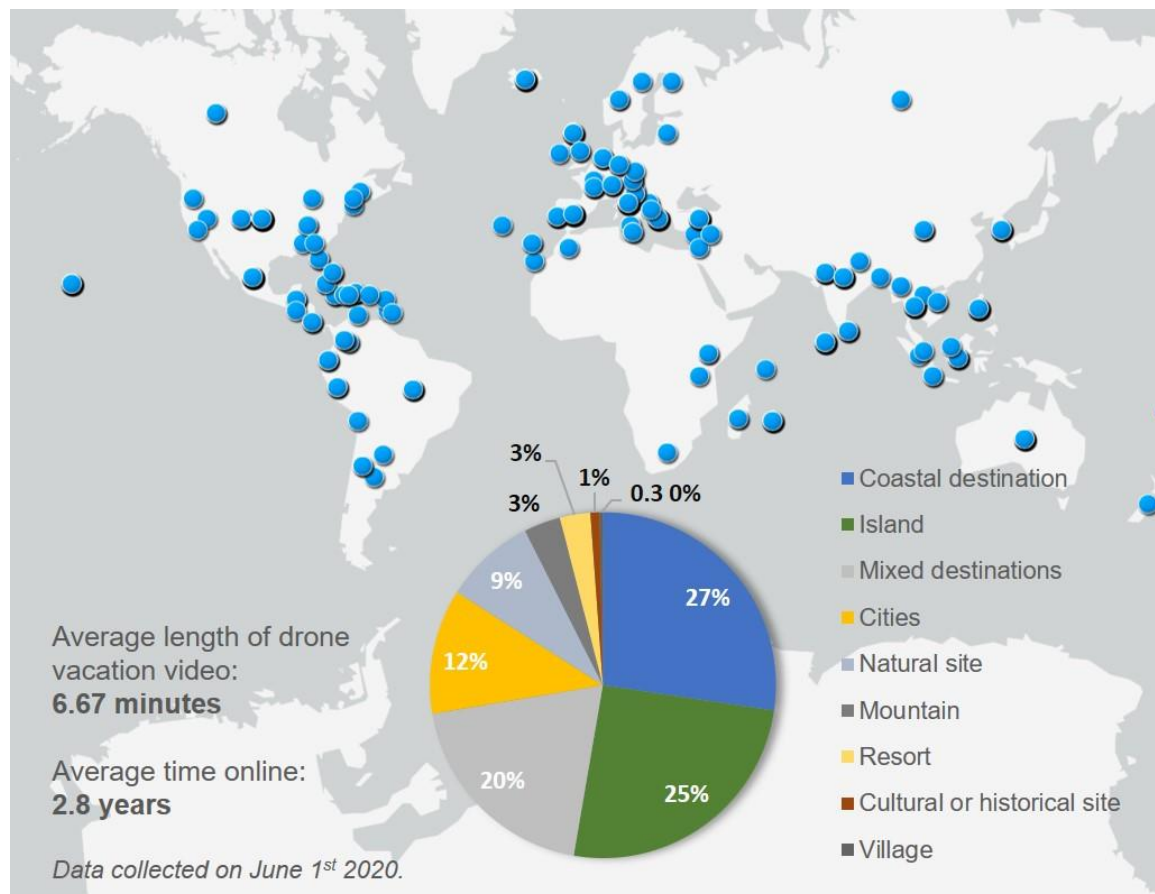
The dimension of social practice		
Conceptual dimension	Measurable variables	Values
(I) High-profile editing	Evident video alterations	<ul style="list-style-type: none"> <li>▪ Yes/No</li> </ul>
	Intro scene of drone video maker	
(II) Digital distance	Time reference	<ul style="list-style-type: none"> <li>▪ Explicit time</li> <li>▪ Relative time</li> </ul>
(III) Composite experience	Number of vacations featured	<ul style="list-style-type: none"> <li>▪ One vacation</li> <li>▪ More than one</li> </ul>
	A mix of drone and terrestrial scenes	<ul style="list-style-type: none"> <li>▪ Yes/No</li> </ul>
(IV) Storytelling inherent in the media form	Narrative storytelling approach	
(V) Importance of practices (activity)	<i>Destination related</i>	
	The activity featured in a video	<ul style="list-style-type: none"> <li>▪ Yes/No</li> </ul>
	Drone creator visible	
	Drone creator companions	
	Main setting	<ul style="list-style-type: none"> <li>▪ natural settings</li> <li>▪ man-made attraction</li> <li>▪ hotel settings</li> <li>▪ a mix</li> </ul>
	<i>Drone production-related</i>	
Creator information	<ul style="list-style-type: none"> <li>▪ Embedded in video</li> <li>▪ In video description</li> <li>▪ Both available</li> </ul>	
	Info about drone	<ul style="list-style-type: none"> <li>▪ Not available</li> <li>▪ Embedded in video</li> <li>▪ In video description</li> <li>▪ Both available</li> </ul>

Data were transferred into SPSS Statistics V27 for further descriptive statistical analysis. A *chi-square* test for independence was used to determine the existence of associations between the three groups of drone vacation video creators and the technical and social dimensions of the videos.

### 3.3. Sample characteristics

Figure 1 summarizes the basic metadata characteristics of vacation drone videos in the sample. A simple country overview indicates that the spatial distribution was not equally distributed, as three global hotspots appeared: Europe, the Americas (with Central America as the epicentre), and South and South-East Asia. A detailed inspection of the types of destination (based on the video locations

scaled to a destination – a city or a region) showed that more than half of the videos were filmed at coastal destinations or on islands. Every fifth video was filmed at multiple destinations, so no dominant type could be determined. Cities, as well as natural sites (protected areas or landmarks) featured in approximately every 10<sup>th</sup> video. Other types of destinations were represented in less than 3% of the sample.



**Figure 1.** Spatial distribution of the drone vacation video sample and types of destination.

## 4. Results

### 4.1 Technological dimension of representation

Making videos comprising of multiple moments from a vacation is the prevailing practice. No significant association between type of creators and vacation segments was found. Around two-thirds of creators used time manipulations (e.g., time-lapse or slow-motion) to emphasize certain scenes, in combination with real-time shots. Here, there were significant associations between types of creators and frequencies of time-manipulated videos, as drone professionals used real-time significantly more than expected, that is, they manipulated time less. None of the creators used just the compression or expansion of time in their videos.



**Table 3.** Frequency of videos using vacation segments and time manipulations.

Creators	(I) Visual continuity and time			
	Vacation segments		Time manipulation	
	One segment	Multiple segments	Real-time	A mix
Tourists	6.2%	93.8%	28.2%	71.8%
Influencers	11.5%	88.5%	27.6%	72.4%
Professional drone pilots	6.9%	93.1%	54.0%	46.0%
<b>Total</b>	<b>7.7%</b>	<b>92.3%</b>	<b>34.5%</b>	<b>65.5%</b>
<i>N</i>	351			351
<i>Pearson Chi-Square</i>	2.39			19.58
<i>df</i>	2			2
<i>p</i>	0.3			0.0

Using music as a background for drone vacation videos was a dominant practice, and every fifth video contained narration with music. Other combinations of audio processing were extremely rare. In the case of professional drone pilots, the use of music was almost exclusive, that is, they did not frequently combine narration with music. The majority of creators excluded drone take-off and landing segments in videos, while drone professionals almost never used those aspects in their videos. Here, among all videos drone take-off was present in every fifth video, while drone landing was present in less than 3%.

**Table 4.** Frequency of creators using audio processing and time drone motions.

Creators	(II) Multiply of clues - Audio processing					(III) Motion – Drone motions			
	Narration	Music	Narration with music	Real-time or drone sounds	No audio	Drone take-off	Drone landing	Both	None
Tourists	0.6%	72.9%	24.9%	0.6%	1.1%	20.3%	3.4%	4.5%	71.8%
Influencers	0.0%	69.0%	29.9%	1.1%	0.0%	20.7%	4.6%	5.7%	69.0%
Professional drone pilots	0.0%	95.4%	3.4%	0.0%	1.1%	4.6%	0.0%	2.3%	93.1%
<b>Total</b>	<b>0.3%</b>	<b>77.5%</b>	<b>20.8%</b>	<b>0.6%</b>	<b>0.9%</b>	<b>16.5%</b>	<b>2.8%</b>	<b>4.3%</b>	<b>76.4%</b>
<i>N</i>	351					351			
<i>Pearson Chi-Square with Fisher's Exact Test</i>	30.58					21.30			
<i>p</i>	0.00					0.00			

Amongst the different filming techniques, the most frequent were fly-over and aerial shots. Pull-back, crane, and bird's eye shots were also very common. Tracking, as a feature of only certain drones, was less used, whilst reveal shots, a classic cinematography technique, were the least used. As expected, drone professionals used more reveal shots, as well as aerial and crane shots. The difference here is statistically significant and substantial.

**Table 5.** Frequency of videos that employ different filming techniques.

Creators	(IV) Perspective - Filming techniques						
	Reveal	Bird's eye	Aerial	Flyover	Tracking	Pull-back	Crane
Tourists	14.7%	59.3%	76.3%	91.0%	45.2%	66.7%	66.1%
Influencers	13.8%	71.3%	85.1%	96.6%	39.1%	75.9%	69.0%
Professional drone pilots	26.4%	70.1%	93.1%	94.3%	31.0%	78.2%	90.8%
<b>Total</b>	<b>17.4%</b>	<b>65.0%</b>	<b>82.6%</b>	<b>93.2%</b>	<b>40.2%</b>	<b>71.8%</b>	<b>72.9%</b>
<i>N</i>	351	351	351	351	351	351	351
<i>Pearson Chi-Square</i>	6.62	5.00	11.99	3.08	4.93	4.51	18.95
<i>df</i>	2	2	2	2	2	2	2

<i>p</i>	<b>0.04</b>	0.08	<b>0.00</b>	0.21	0.08	0.08	<b>0.00</b>
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#### 4.2 Dimension of social practice

None of the creators from the sample used explicit video alterations (e.g., unnatural colour alterations and/or video animations), while introduction scenes were used in less than a fifth of the videos. The vast majority of creators used implicit time references (such as ‘last summer’, ‘this year’s vacation’) in the video description. As expected, almost all videos were filmed during one vacation, not as a combination of two or more vacations.

Around 40% of videos were just made from scenes filmed exclusively by drones, while the rest used these in combination with videos filmed on the ground. It must be noted that this was not the case with drone professionals, who used terrestrial videos in only about 20% of the cases. Approximately, every 10<sup>th</sup> video was created using a narrative storytelling script (e.g., giving a story behind a vacation, and/or an explanation of its progression), again except for professional drone pilots who rarely employed storytelling.

**Table 6.** Frequency of videos using high-profile editing, expression of digital distance, composite experience, and storytelling

Creators	(I) High-profile editing		(II) Digital distance -Time reference		(III) Composite experience			(IV) Narrative storytelling approach
	Evident video alteration	Into scene			Number of vacations		Mix with terrestrial videos	
			Explicit	Implicit	One	Multiple		
Tourists	0	18.6%	35.6%	64.4%	98.9%	1.1%	72.3%	11.3%
Influencers	0	21.8%	25.3%	74.7%	95.4%	4.6%	69.0%	10.3%
Professional drone pilots	0	11.5%	11.5%	88.5%	97.7%	2.3%	23.0%	1.1%
<b>Total</b>	<b>0</b>	<b>17.7%</b>	<b>27.1%</b>	<b>72.9%</b>	<b>97.7%</b>	<b>2.3%</b>	<b>59.3%</b>	<b>8.5%</b>
<i>N</i>	-	351	351		351		351	351
<i>Pearson Chi-Square</i>	-	3.44	17.35		3.14		63.30	8.17
<i>df</i>	-	2	2		2		2	2
<i>p</i>	-	0.18	0.00		0.21		<b>0.00</b>	<b>0.02</b>

For both tourists and influencers, showing activities in drone vacation videos was a practice in approximately half of the videos, while for drone professionals this was less important. The appearance of drone creators and their companions was also a frequent practice for tourists and influencers, in contrast to professional drone pilots. To sum up, for all these three variables, tourists exhibited higher frequencies than expected than the other creator groups, while professional drone pilots exhibited low levels of these.

A clear majority provided additional creator information in their video’s description, or they provided it in both the description and in the video. Here, we see that influencers more frequently provided creator information in both places. As expected, providing drone information was important to the majority of creators, and they provided it in most cases in the description. There were no statistically significant associations between creator type and the provision of drone information.

**Table 7.** Frequencies of different creators' practices.

Creators	(V) Importance of practices (activity)									
	<i>Destination-related</i>			<i>Drone production-related</i>						
	The activity featured in a video	Drone creator visible	Drone creator companions	Additional creator information			Drone information			
				Embedded	Description	Both	Not available	Available in av video	Available in description	Both available
Tourists	57.6%	83.6%	77.4%	6.2%	70.6%	23.2%	39.0%	0.6%	58.2%	2.3%
Influencers	54.0%	78.2%	65.5%	3.4%	56.3%	40.2%	31.0%	0.0%	66.7%	2.3%
Professional drone pilots	27.6%	29.9%	26.4%	8.0%	65.5%	26.4%	34.5%	0.0%	64.4%	1.1%
Total	49.3%	68.9%	61.8%	6.0%	65.8%	28.2%	35.9%	0.3%	61.8%	2.0%
<i>N</i>	351	351	351	351			351			
<i>Pearson Chi-Square</i>	22.10	83.24	64.86	9.5			3.29			
<i>df</i>	2	2	2	4			6			
<i>p</i>	0.00	0.00	0.00	0.05			0.77			

Filming exclusively natural sites was a generally predominant practice (Table 8), while approximately one third used a mix of natural and some other thematic areas. Tourists filmed natural sites more than the other creator groups, and fewer cultural and man-made attractions. Professional drone pilots filmed significantly more cultural and man-made sites. A focus on just a hotel facility, excluding the main destination attraction, was recorded in less than 5% of videos.

**Table 8.** Frequencies of different creators' practices related to main drone vacation video setting.

Creator	(V) Importance of practices (activity)			
	<i>Destination related (main setting)</i>			
	Natural site	Cultural and man-made	Hotel facility	A mix
Tourist	59.9%	4.5%	4.5%	31.1%
Influencer	47.1%	12.6%	4.6%	35.6%
Professional drone pilots	48.3%	17.2%	3.4%	31.0%
Total	53.8%	9.7%	4.3%	32.2%
<i>N</i>	351			
<i>Pearson Chi-Square</i>	13.83			
<i>df</i>	6			
<i>p</i>	0.03			

## 5. Discussion and Implications

Based on the above results, a series of theoretical and practical implications were identified. The following section highlights these implications and compares them to the findings of other relevant research.

### 5.1 Theoretical implications

The theoretical implications of this research for tourist videography can be grouped in the areas of *consumer-technology interaction on vacation*, *virtual tourism*, and *user-generated content on social media*.

Undoubtedly, using drones on vacation has become a global trend (Flynn 2016). Based on this analysis of vacation drone videos on *YouTube*, results suggest that this practice occurs globally. In particular, destinations that offer much open-air space, such as coastal destinations or islands are the most welcoming for this kind of practice (Chen et al. 2019), confirming that regulatory issues significantly determine areas or destinations where drones will be employed the most. This is also confirmed by the fact that professional drone pilots more frequently film cultural and man-made attractions that require more expertise than amateur drone pilots or influencers.

In general, the social dimension of tourism drone videos plays a more important role in differentiation between creators, than the technological dimension, confirming the value of applying a tourist videographic analysis (Dinhopl & Gretzel, 2016) to understand the consumer use of this technology. All types of creators, in relatively equal proportions, provide information on the drone used for filming, confirming that these facts are also an important component of vacation drone videos for the majority of creators. Tourists and influencers, as drone vacation video creators, are more oriented to self-promotion, by showing themselves and others in their videos, as well as various tourist activities in a destination, and sometimes they present the whole vacation in a form of storytelling with the addition of narration to music. Also, they mix drone videos with terrestrial videos to better present their experiences. By doing so, they also create an online identity that allows them to better associate with specific drone video groups.

As a new type of user-generated content (Lu & Stephenkova, 2015; Munar & Jacobson, 2014) in tourism, the specific nature of shared vacation drone videos has only recently begun to be acknowledged (Stankov et al., 2019) meaning that the technological, social representative and mediative (Dinhopl & Gretzel, 2016) aspects of the phenomenon are not yet well understood. Although this study did not focus on the sharing of the videos and the engagement with them, it examined elements of social practice (such as providing description of a creator, destination or a drone), meaning that it has value for future analyses featuring drone videos. Furthermore, better knowing the characteristics of vacation drone videos contributes to our understanding of the visual turn in social media, and especially in social media marketing, with destinations and attractions being increasingly represented by complex visual materials (Gretzel 2017). Vacation drone videos, seen as data, are a new, important source of information for developing insight into the sense of a place, navigation, or for further analysis as a new source of data about tourist destinations (Stankov et al. 2019b). Understanding what could be expected from videos created by tourists, influencers, and drone pilots can be of paramount importance in developing work in this area.

## ***5.2 Practical implications***

The results from this exploratory study could be of use for marketing and management activities carried out by DMOs or tourism businesses, and for national tourism organisations.

Using various social media sites, consumers now can easily search tourist videos posted by other tourists and individuals, or by official DMOs, before making travel decisions (Lim et al., 2012). According to a USA-based study, two out of three consumers watch online travel videos when they are seeking information about their trips (Crowel et al. 2014). The importance of vacation drone videos is particularly noteworthy, since they are created by actual tourists (despite the potential bias from the financial interest of influencers, and the work-related motivations of professional drone pilots). In addition, drone videos are still a novel and attractive media form that creates an extra WOW effect among spectators (Stankov et al. 2019a). Based on the results of this research, three practical implications can be pinpointed.

As a globally recognised consumer trend it could be catered for more, in terms of different countries, regions, and destinations that lag behind in enabling and supporting drone video recording by consumers (e.g., providing drone landing platforms, drone charging and sharing facilities, drone lessons/experts on site, etc.), but also in terms of facilitating drone use away from isolated open-areas, if that practice does not conflict with justified restrictions on their use. Here, some social dimensions could also be applied to encourage drone filming (for example, recognizing drone creators on official DMO sites or similar). These additional initiatives to support the consumer uses of drones in destinations would work in parallel with the facilitation of drones by DMOs as part of smart-tourism approaches to destination management (Coca-Stefaniak, 2019), as well as where their use has also been prompted by the COVID-19 pandemic (Zeng et al., 2020).

Music is often a necessity in vacation drone videos to cover the drone noise. However, to provide content-rich destination vacation videos that would appeal more to viewers, and to convey greater information about the destination, the use of narration and real-time videos should be encouraged. This could include, for example, the gamification of drone filming or creating engaging online platforms (e.g., drone maps) for uploading geo-tagged videos and providing audio or textual comments to support their co-creation (Gretzel, 2017; Stankov et al. 2019b).

Although vacation videos created by drone professionals will not convey as much detail as destination-related productions, they will still be more visually appealing due to their use of techniques such as reveal, aerial, or crane shots, which could also leave a strong impression on the viewers. This is especially important in relation to other findings that show that the value of UGC for destinations is highly dependent on their quality (Hautz et al. 2014).

Finally, virtual tourism, in the form of augmented reality or the exploration of remote landscapes in real-time is often associated with the use of drones (Mirk and Hlavacs 2014; Rutkin 2015; Fabola et al. 2018). Understanding the characteristics of different creators' drone vacation videos could greatly help in the development of aerial immersive mixed reality (Kim et al. 2018), since tourists and influencers, guided by entertainment (Tham 2020) or financial subsidies, with less technical knowledge, produce videos that focus on different practices when compared to professional drone pilots. In this case, if an online community is created around these videos, it would be expected that creators already engaged with drone usage on vacation would be drawn more to aerial immersive mixed reality production.

## **6. Limitations and further research**

This paper presents exploratory research and the results come with several limitations. First, the conclusions about drone vacation videos were based on the final products of their creators, that is, videos published on *YouTube*. This was a justifiable approach, as the main aim of the paper was to explore an already existing trend. However, that left the results without direct confirmation of the creators' motivation to film and post videos in the first place, or an understanding of their interaction with drones during trip preparation and on-site travel phases. Another important limitation is that the individual videos were observed in isolation, not all the videos of one creator. Thus, the results of this study focus on overall characteristics and dimensions of vacation drone videos, rather than individual practices.

The absence of sophisticated tools to automate content analysis has limited the sample to 351 videos. Although this sample is large enough for content analysis in an exploratory work, further research should make use of a larger number of drone vacation videos, and preferably include the use

of semi-automatic approaches to video content analysis. The sample mostly included popular destinations, as the results of the *YouTube* searches were limited to most relevant videos. Further research could use regional analyses and investigate different types of destinations. As noted previously, some destinations are more suitable for the employment of drones in tourism experiences (Rocha 2014), resulting in the accumulation of videos for the most popular, or the most suitable, for drone video filming. Further research could be focused, for example, on urban destinations, since the use of drones is popular in urban-recreational areas, and it would be interesting to see what kinds of social practices are apparent there, especially in light of recent calls to further restrict the use of drones by consumers (Watkins et al., 2020).

As a starting point for the content analysis, a relatively new conceptual framework of tourist videography was used to create measurable variables to quantify elements of the technical and social dimensions of vacation drone videos. However, this is not a complete set of variables that could be used, and future approaches could be developed using alternative or yet to be developed frameworks. Further development of drone video production might allow for new filming techniques and new ways of video development and sharing, creating a necessity for these new approaches. Some of the variables used in this research may be considered to convey both technological and social dimensions. For example, providing an introduction scene to a video or drone information could be seen as a standard technical procedure (similar to *GoPro Hero* introduction videos) or as an element of social practice, indicating the need for further developments in measuring elements of tourist videography in novel ways. Thus, an important avenue of research could be a netnographic investigation (Tavakoli and Wijesinghe 2019) of drone communities and how they discuss the technology and its social practices.

Most importantly, to provide tourist organizations with data-driven recommendations, a further examination of viewers' engagement with drone vacation videos is of paramount importance. DMOs should see vacation drone videos as a potential resource, and they should be tracking them to gain valuable consumer preference data and product development ideas. It would be interesting to determine if there is a particular type or set of filming techniques that appeal to viewers more than others, or a certain type of destination whose drone videos attracts more viewers. However, user engagement on social media is influenced by various factors, not just content itself (Crane and Sornette 2008), thus more complex methodologies have to be employed to measure the contributing value of every factor.

#### ACKNOWLEDGEMENT

This publication is based upon work from COST Action CA19142 - Leading Platform for European Citizens, Industries, Academia and Policymakers in Media Accessibility supported by COST (European Cooperation in Science and Technology).

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