Smart technologies in the Covid-19 crisis: Managing tourism flows and shaping visitors' behaviour

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Abstract

This paper contributes to the academic debate on tourism destination development in the COVID-19 crisis, by investigating the role of smart technology tools for managing tourism flows and shaping visitors' behaviours. Considering tourism in the COVID-19 crisis as an emerging stream of research, the paper assumes a continuity with the overtourism research (pre-COVID-19) and builds on the cross-fertilization between the advances in this field and the smart destination literature. Based on an explorative online news media analysis, the paper provides fresh knowledge on the role of smart technologies in destination management, by proposing the Smart Technology Matrix. This frames the smart-tech tools and provides the conceptual background for opening future paths of inquiry on smart tourism destinations in the Covid-19 context.

Key words: smart technology, COVID-19, overtourism, smart tourism destination, tourism flows, visitor behaviour

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Introduction

The COVID-19 pandemic has locked down the world generating human, social, and economic crises. In the context of a weaker world economy, global tourism represents one of the most affected sectors with strong expected negative impacts of the lockdown and post-lockdown phases on both travel supply and demand. Estimates suggest that in 2020 global international tourist arrivals will record 20-30% decline, with a loss of 30 to 50 billion USD expenditure by international visitors (UNWTO, 2020). The global 2020 pandemic, the travel restrictions and the sanitary rules, with a durable impact on revenues and employment (Gössling *et al.*, 2020), debunked the consolidated tourism paradigms and mass-market models of tourism development according to which growing tourism flows and revenues represent the prevailing goals of the destination.

Venice, which represented the iconic global model of overtourism with the “Venice syndrome” referring to tourism saturation and forms of resident displacement (Milano, 2017), has become the symbol of the dramatic impact of the Covid-19 crisis on tourism. This monoculture economy has been losing income along with the shrinkage of international tourist flows. The debate that started in Venice - like in many cities around the world - about the need to control and manage incoming tourist flows before the Covid-19 crisis, is now even more urgent to guarantee the reopening of the destinations to tourism. Softer tourism models, physically limiting the number of visitors, and new business models for tourism entrepreneurs are needed. The New Zealand government defined 2020 the year to inspire locals to explore and deepen knowledge on their own territories. It levered on the sentiment of New Zealanders who, right before the current crisis, were complaining about overtourism, expressing a desire to move towards a ‘taste of undertourism’.

Scholars, policymakers and institutions need to rapidly redefine future scenarios and identify possible solutions to address and manage tourism flows and visitors' behaviours in post COVID-19 destinations. Recent research proposed a radical rethinking of those mass tourism development models that boosted the overtourism phenomenon, opening routes towards sustainable destination development (Goodwin, 2019; Cheer *et al.* 2019; Dodds & Butler, 2019; Koens, Postma & Papp, 2018; Milano *et al.*, 2019; Novy & Colomb 2019; Pasquinelli & Trunfio, 2020a; Pasquinelli & Trunfio, 2020b; Peeters *et al.*, 2018). Addressing and managing overcrowding, anti-tourism and tourismphobia, which represented a corollary of overtourism in the destination, is now a general challenge for all tourism destinations in post COVID-19 era, to pursue social and economic recovery and sustainable development.

Academic and practitioners' debate on overtourism remains a repository of knowledge and practices in a time of ‘undertourism’, with the overtouristified destinations representing a meaningful reference for tourism management in the COVID-19 crisis. The overtourism literature informs about those strategies, actions and tools - including smart technology tools - to manage tourist flows and direct tourist behaviours in order to deal with crowding and reduce tourism negative factual, behavioural and perceptual impacts (Paquinelli & Trunfio, 2020b).

Since the lockdown phase, it has been evident how smart technologies might play a significant role in helping people to deal with the social and psychological crisis. The quarantine is likely to enhance the value of the use of smart technologies, allowing people to connect, facilitating smart working and education, and enhancing the value of virtual entertainment at home.

Although the use of ICTs in smart destinations represents a consolidated yet extremely current topic, the role of smart technology is still debated in the overtourism research. How smart technologies can

help decision-makers to manage and address tourism flows and behaviours and how they can help redefine the destination development models in the COVID-19 time, remain open questions.

This paper aims to contribute to the academic debate on the potential trajectories of tourism destination development in the COVID-19 time, by investigating the role of smart technology tools for managing tourism flows and shaping visitors' behaviours. Considering tourism in the COVID-19 crisis as an emerging stream of research that benefits from a synthesis of diverse existing theoretical frameworks, the paper assumes a continuity with the overtourism research (pre-COVID-19) and builds on the cross-fertilization between the advances in this field and the smart tourism destination literature. The paper proposes an online news media analysis, which helps reach insight into the evolution of tourism destinations in the current global scenario. This research draws from the insights into overtouristified destinations to cast light on the viable smart tools and practices that may facilitate post COVID-19 tourism re-launch, by enabling the management of tourism flows and shaping visitors' behaviours towards sustainable development.

The paper is organised as follows. Firstly, the theoretical framework is presented, combining the advances in the overtourism and smart tourism destination research agendas. Secondly, the research methodology is grounded on an online news media analysis, which configures an exploratory approach to framing how destination managers and policymakers understand and adopt smart technologies to manage and address the tourism impacts. Findings, discussion and conclusion provide fresh knowledge on the role of smart technologies in destination management, postulating unprecedented changes and challenges related to the COVID-19 crisis and opening new research path.

Theoretical background

The debate on the overtouristified destinations

Debunking the value of the exponential growth of mass tourism development, recent literature focused on tourism-degrowth paradigm, prioritising sustainability, equity and inclusion over the tourism industry market's logic (Cheung and Li, 2019; Cheer *et al.*, 2019; Higgins-Desbiolles *et al.*, 2019; Koens, Melissen, Mayer & Aall, 2019; Milano *et al.*, 2019; Pasquinelli & Trunfio, 2020a). This radical rethinking of the mass tourism development, rooted in decades of theoretical and empirical analyses in the sustainable tourism research domain (Milano, 2019; Capocchi *et al.*, 2019; Pasquinelli & Trunfio, 2020a), concerns the overcoming of the growth models that characterised the overtouristified destinations (Goodwin, 2019; Novy & Colomb 2019; Peeters *et al.*, 2018).

Sustainable tourism research identified a broad and consolidated theoretical framework (Butler, 1980, 1999; Nash & Butler, 1990; Ruhanen, Weiler, Moyle, & McLennan, 2015), in which the recent overtourism theoretical debate can be positioned (Pasquinelli & Trunfio, 2020b) and interpreted as "old wine in new bottles" (Dredge, 2017). Capitalising on decades of established theoretical and empirical analyses, the sustainable tourism research built a holistic and integrated development model, where environmental, socio-cultural and economic dimensions are gears of the same mechanisms balancing destination stakeholders' perspectives and behaviours.

Since the 1970s the visitor overkill definition (Rosenow & Pulsipher, 1979), which can be considered an early conceptualization of the overtourism phenomenon, drew attention to issues of temporal and spatial concentration of visitors (Pasquinelli & Trunfio, 2020b). This conceptualization focused on the impacts of visitors' concentration on the physical environment and local quality of life, without neglecting the difference that tourists' behaviours can make in both regards. If this can be considered an early conceptualisation of *tourism impacts management*, subsequent significant efforts were made

to define crowding in tourism destinations, stressing not only tangible and physical impacts, but also the most intangible yet relevant ones. Tourism growth does impact on residents' perceptions of the social costs of tourism, of crowding and of the related influence on their daily life and on their relation with the destination (Perdue, Long, & Kang, 1999; Stewart & Cole, 2001; Fleishman, Feitelson, & Salomon, 2004; Riganti & Nijkamp, 2008; Pasquinelli & Trunfio, 2020b). Personal and context characteristics (Stokols, 1972; Teye, Sirakaya, & Sönmez, 2002), and the economic involvement in tourism (Andereck *et al.*, 2005) were said to moderate the perceived tourism impacts.

Recent overtourism scholarship reconsidered the theoretical frameworks inherited from the past and from the longstanding debate on the tourism impacts in an attempt to reframe the destination development models, towards the overcoming of tourism conflicts and imbalances (Milano, 2017; Koens, Potsma & Papp, 2018; Muler Gonzalez, Coromina, & Galí, 2018; Pasquinelli & Trunfio, 2020b).

Overtourism is both a quantitative (e.g., high and increasing number of tourists) and a qualitative phenomenon. It was interpreted as the entanglement of *factual* (e.g., traffic, rising costs of renting, litter and noise), *behavioural* (pervasiveness of tourists and misbehaviours, residents' moving out from central areas, anti-tourism attitude, fears and a sense of irritation for tourists) and *perceptual effects* (stakeholders' subjective interpretation of the tourism impacts) (Pasquinelli & Trunfio, 2020b). As an implication of this overarching conceptualization, not only residents', but also tourists' behaviours and perceptions of crowding were considered, influencing the destination experience and tourists' propensity to repeat their visit (Jin, Hu, & Kavan, 2016; Rasoolimanesh *et al.*, 2017; Sun & Budruk, 2017; Yeh, Wai Aliana, & Zhang, 2012).

Addressing and managing tourism flows and visitors' behaviours

Embracing the tourism de-growth paradigm implies considering both the quantitative dimension of the overtourism phenomenon, by managing tourists' flows, and its qualitative dimension, by addressing and managing tourists' and stakeholders' behaviours and perceptions.

The overtourism debate discussed actions, tools and strategies to address and manage tourism flows and visitors' behaviours (Séraphin *et al.*, 2018; Cheung and Li, 2019; Dodds & Butler, 2019; Goodwin, 2019; Higgins-Desbiolles *et al.*, 2019; Koens *et al.*, 2019; Oklevik *et al.*, 2019; Pasquinelli & Trunfio, 2020b; Séraphin *et al.*, 2019). Two main approaches emerged from the debate: a conservative approach, according to which overtourism can be managed notwithstanding tourism growth, and a radical approach according to which tourism growth models need to be rethought (Pasquinelli & Trunfio, 2020b). For the former, technical-tactical solutions, such as "good planning and management" (WTTC & McKinsey, 2017; UNWTO, 2018), effectively address tourism flows. For the latter, a radical rethinking of tourism growth models needs for a broader reflection on governance, behavioural change and travelling culture (Cheer *et al.*, 2019; Higgins-Desbiolles *et al.*, 2019; Koens *et al.*, 2019).

Literature proposed three diverse approaches to address and manage overtourism imbalances and to influence stakeholders' perceptions and behaviours (Pasquinelli & Trunfio, 2020a): regulation, management and marketing. They range from conservative and policy-oriented approaches, which lever on traditional tools to mitigate tourism flows, to approaches introducing innovative tools of destination management.

Firstly, the regulation approach summarizes a conservative perspective, which aims at mitigating tourism flows and behaviours' impacts on the destination. Political-institutional power defines rules and limitations to mitigate or redirect tourist flows and control economic activities. Both the

management approach and marketing approach overcome the coercive nature of the regulation approach and lever on visitors' and residents' involvement in the destination development model. The management approach designs destination strategies in which residents and tourists are called to play an active role in reducing the negative impacts of overcrowding in specific areas of the destination, such as old towns or main attractions. Dispersal strategies, based on alternative itineraries and experiences to move tourists away from most popular attractions, and smart ticketing and dynamic pricing aim to reduce the pressure on certain areas towards less crowded parts of the destination.

The marketing approach applies the main strategic and operative marketing tools to inform, persuade and change tourists' and residents' behaviours to co-create destination sustainable development. Sustainability marketing, supported by demarketing actions, may increase awareness of the responsible tourism, influencing visitors and residents' behaviours (Font & McCabe, 2015). Developing managerial and marketing tools increases individual and collective responsibility within the complex framework of sustainability, improving liveability and quality of the visitor experience, benefiting both visitors and residents, tourism and non-tourism actors (Koens *et al.*, 2019; Mora *et al.*, 2018).

Smart tourism destination and sustainable development

ICTs and smart tourism destinations (STDs) represent a consolidated, but extremely current topic in tourism studies (Boes, Buhalis & Inversini, 2015; Buhalis, 1998; Buhalis & Amaranggana, 2014; Del Chiappa & Baggio, 2015; Gretzel, Yuan, and Fesenmaier 2000; Gretzel, Sigala, Xiang & Koo, 2015).

The concept of the smart destination is part of the evolutionary concept of the smart city, which presents several definitions (Errichiello & Micera, 2017; Camero & Alba, 2019; Cavalheiro *et al.*, 2020). It entangles technological tools (ICT infrastructures, the Internet of Things, cloud computing and end-user Internet service systems, open data and augmented and virtual reality), people and institutions to create public value (Desdemoustier *et al.*, 2019), and involves investments in human and social capital, infrastructures facilitating sustainable economic growth and quality of life (Caragliu *et al.*, 2011). In the STD, the role of ICTs is to provide the platforms through which knowledge and information are instantly and easily exchanged, facilitating stakeholders' collaboration (Jovicic, 2019).

As a digital business ecosystem, which combines real and virtual components and involves diverse stakeholders (Baggio & Del Chiappa, 2013), the STD nurtures a digital environment that supports communication, cooperation, knowledge sharing, consensus building, and open innovation (Del Chiappa & Baggio, 2015). It drives paradigm change and innovation, contributing to the creation of new business and destination models in which tourism experiences can be co-created, leveraging on technological platforms that dynamically interconnect and engage the diverse stakeholders (Bonincontri & Micera, 2016; Buhalis & Amaranggana, 2014; Ivars-Baidal, Celdrán-Bernabeu, Mazón, & Perles-Ivars 2019; Sigala, 2018; Trunfio & Campana, 2019; Williams, Rodriges & Makkonen, 2020).

A technological bias, including imitative strategies or persuasive power of the technology providers, has to be avoided and the main strategic-relational barriers of the evolution towards the STD can be overcome by leveraging on inclusive governance processes (García-Hernandez *et al.*, 2019; Ivars-Baidal *et al.*, 2019). Prioritized over single and specific technological solutions, new governance models and participative strategies can reinforce knowledge, driving the destination towards innovative resources and capabilities (Ivars-Baidal *et al.*, 2019; Trunfio & Della Lucia, 2019). Combining governance models, social capital and innovations, a smart destination allows efficiency, experience co-creation and sustainability (Gretzel *et al.*, 2015; Trunfio & Campana, 2019).

Accordingly, the literature introduced a way to address overtourism through the pursuit of a sustainability transition in the destination (Koens *et al.*, 2019), creating opportunities for improving the quality of life and enhancing sustainable urban development. Going beyond the narrow focus on the ICTs, to read them in the broader framework of sustainable development, recent overtourism literature introduced the Smart City Hospitality Framework (Koens *et al.*, 2019) and the Smart-City Lens (Pasquinelli & Trunfio, 2020a). These frameworks provided an opportunity to integrate the STD with key urban issues regarding mobility, housing, provision of services, social segregation and the environmental footprint.

The Smart City Hospitality Framework proposed a destination design-driven approach to governing tourism in the city, by merging sustainable development and the city hospitality dimensions. City hospitality, understood as liveability, experience quality, smart hospitality, sustainability and equitability (from natural, social and economic perspectives), and resilience (as an ability of the urban systems to adapt to structural change), are all gears of the smart city mechanisms guaranteeing urban sustainability (Koens *et al.*, 2019).

The Smart-City Lens (Pasquinelli & Trunfio, 2020a) assumes sustainable development in knowledge-based destination is driven by three key elements: internal and external actors (including tourists), ICTs platforms and social capital. These are at the core of those mechanisms facilitating inclusive forms of sustainable tourism development, thus overcoming the limitations of the technology-led approaches that seek technical efficiency and effectiveness (Trunfio & Campana, 2019). This framework tries to reconcile forms of bottom-up engagement in sustainable development with an institutional top-down dimension (Pasquinelli & Trunfio, 2020a).

Building on the Smart City Hospitality Framework, the Smart-City Lens model reinterprets city hospitality, sustainability and resilience as meta-effects enhancing economic recovery and equitability, driving quality of life and raising the value of the tourism experience (Pasquinelli & Trunfio, 2020a). Acknowledging the different nuances of the smart city approaches in their concrete applications (De Jong *et al.*, 2015; Angelidou, 2017; Desdemoustier *et al.*, 2017), the Smart-City Lens reframes overtourism and allows a reinterpretation of change in socio-economic scenarios in which actors' roles and rules impose to rethink of the tourism development model.

A set of dichotomies, including the top-down versus bottom-up approach and the mono-dimensional versus integrated logic of intervention, allows envisioning the deployment of smart technologies to manage and address tourism flows and behaviours (Pasquinelli & Trunfio, 2020a). The former dichotomy suggests to look at the combination between, on the one hand, the central role of government in defining specific roles and rules through their decision-making and planning capacity (top-down) and, on the other hand, wide stakeholders' engagement, grassroots forces and self-organizing movements, including individual tourists' responsible behaviours and choices responding to the urban challenges.

Moreover, the mono-dimensional logic suggests a narrow focus on addressing tourism issues and impacts in contrast with the integrated logic of intervention across many different economic and social territorial domains. According to the latter, strategies and actions need to be rooted not just into tourism and hospitality, but also into public health, public space use and management, transport and mobility planning and monitoring, and commerce regulation. While significant governance challenges are intrinsic to such logic, ICTs are said to support and amplify cross-sectoral integrations.

Smart technology tools for sustainable development

Consolidated literature focused on smart destination ICT-based tools connecting political actors, destination management organizations (DMOs), enterprises and local communities, and driving pervasive knowledge and innovation (Buhalis and Amaranggana 2015; Errichiello and Marasco, 2017; Racherla, Hu, and Hyun 2008; Stamboulis and Skayannis 2003; Trunfio & Campana, 2019). Although ICTs and smart tourism destinations firmly entered the academic debate, the literature lacks theoretical and empirical analyses on the role of smart technologies in addressing and managing tourism flows and visitors' behaviours in overtouristified contexts. Smart technologies were considered to a limited extent in the overtourism literature (Zubiaga *et al.*, 2019; Ivars-Baidal *et al.*, 2019; García-Hernández *et al.*, 2019). Smart tools are considered as viable to address overtourism, but they are often used in an occasional way and with a limited scope (Ivars-Baidal *et al.*, 2019) and seem "incapable of reverting tourist overcrowding processes" (García-Hernández *et al.*, 2019, p. 29).

Awareness of the need to place smart technologies within a broader framework of city management has been growing. The production of indicators and the procedures for data collection and analysis (Zubiaga *et al.*, 2019) represent key milestones to track tourist flows and reduce overcrowding in a destination through planning.

Literature proposed diverse smart technology tools supporting sustainable development (Ali & Frew, 2014), including the redirecting of tourism flows from iconic sites (Font & McCabe, 2017), and practice-oriented debate recommended the use of technologies to address overtourism and promote sustainable destinations (UNWTO, 2018). Smart technology tools provide a rich set of solutions to support decision-making (analysing, monitoring, and managing visitor flows) and to address tourists' behaviours (Pasquinelli & Trunfio, 2020b). They can enable the reframing of the role of diverse stakeholders: firstly, by shaping tourists' preferences, expectations and behaviours in the destination; secondly, by changing the local community's role in addressing tourist flows and engaging with them.

Smart technology tools for decision-making are, for example (Ali & Frew, 2014; Pasquinelli & Trunfio, 2020b): geo-localisation systems for tracking tourists' smartphones and monitoring tourist flows (e.g., real-time technologies and big data analysis to assess tourism performance and impact); smart technology tools addressing tourism behaviour (e.g. dynamic time-based dispersal flows, dynamic pricing and virtual reality to complement on-site visits, social media usage to promote alternative attractions and information about traffic, parking and facilities); gamification engaging stakeholders in behaviour changes.

Methodology

This article assumes that news media reproduce and propagate narratives that become a powerful device for explaining the ongoing evolution of tourism destinations in the current global scenario, thus influencing public opinion and driving actions (Adams, Harf & Ford, 2014; Hall, 2002, 2003; Schweinsberg *et al.*, 2017; Pasquinelli & Trunfio, 2020b). Tourism studies support news media analysis for their role in shaping the understanding of tourism and its local impacts, and for their capacity to influence decision-makers and, particularly, policymakers and their agenda (Hall, 2002; Schweinsberg, Darcy, & Cheng, 2017; Pasquinelli & Trunfio, 2020b). That is, media can create a buzz around tourism issues and mobilize attention towards approaches, practices and possible tools, which are spread by media through the narration of best practices and models inspiring imitation.

An online news media analysis is presented to provide an exploratory insight into the discourse on overtouristified cities around the world, with a focus on actions and tools, particularly smart technology

tools, that were discussed and adopted by policymakers and practitioners in different geographic contexts to address and manage tourism flows and behaviours towards sustainable development.

The mediatic interest for the overtourism phenomenon has been confirmed in the literature (Phi, 2019; Pasquinelli & Trunfio, 2020b), based on the extensive coverage of overtourism in international media debate and an increase in related web searches over the last two years (Google Trends data).

International media coverage of this phenomenon was intense, given the sense of urgency overtourism was boosting in many destinations worldwide, while the academic debate was still far from a conceptual maturity. Especially weak remains the reflection on strategies, actions and tools to face the overtourism challenge (Goodwin, 2018; Pasquinelli and Trunfio, 2020a). Accordingly, an online news media analysis of the representation of the overtourism phenomenon provided a useful insight (Pasquinelli & Trunfio, 2020b).

Considering online news as the main modality of information worldwide (Mitchelstein & Bockowski, 2009), an original online news articles archive (English language) was constructed through the use of Google Alerts and the tag "overtourism". This alert tag was selected to track the mediatic debate around this term, which originally emerged in the media without any theoretical foundation (Koens *et al.*, 2018; Capocchi *et al.*, 2019). The alerts were collected and analysed over two periods of time, from May 8th to August 23rd 2018 and from April 30th to June 15th 2019. After a first round of news collection, the role of smart technologies clearly emerged as worthy of a dedicated research effort, so that additional information was collected to better understand their role and their potential integration into strategies and actions addressing overtourism. A second round of news collection was, thus, carried out for the analysis presented in this paper.

Table 1 provides a list of the online sources. 130 news articles were considered for the analysis, while some from the Alerts were discarded as not focusing on overtourism: 44 articles were retrieved in 2018 (14 weeks) and 86 in 2019 (6 weeks), suggesting the growing focus on the topic over time. In line with previous research, both hard news (defined as more factual and objective) and soft news (opinion pieces, background stories) constituted the research archive (Fulton, 2005; Pasquinelli and Trunfio, 2020b).

A qualitative content analysis (Berg, 2001; Gunter, 2000; Krippendorff, 2004) of the sampled news articles was made, through manually categorising text fragments as follows: "overtouristified destinations", giving an insight into the geographical contexts where overtourism was considered an issue to be addressed, and "actions & tools", providing information on typology and rationale of the undertaken actions and the utilised tools. All possible tools were considered, from the physical barriers and turnstiles to limit access to the mobile apps for dispersing tourists. The diverse actions and tools according to their underlying rationales were then classified under the categories emerged in literature (Pasquinelli & Trunfio, 2020a), such as regulation (political-institutional power imposing rules, taxes and incentives), management (processes and organization frameworks giving a direction to the destination without coercive tools) and marketing (a market orientation to construct the "product", communicate, share and co-create value).

A second step of the analysis aimed to highlight the specific role of smart technology tools in supporting and shaping actions, which is the core effort of this research. Attention was drawn not only to the explicit use and exploitation of smart technologies (smart technology-based actions), but also to the applicative opportunity in those cases where smart technologies evidently have high potential for integration, although not explicitly mentioned or considered in the analysed news texts. This is part of

the explorative objective of this research. While the role of smart technologies in supporting smart and sustainable destinations is theoretically sustained in literature, this exploratory effort aims to achieve an insight into the practices introducing smart technology tools and into the rationale for their deployment to address overtourism.

Table 1. *The list of the online sources*

Online sources			
2018		2019	
ABTA Magazine	treehugger	abc57	New York Times
Airfarewatchdog	Times of Malta	APNews	npr.com
BBC.co.uk	Travel Weekly	Ausleisure	NZ Herald
CGTN America	Traveller.com	Bloomberg	Post Magazine PRWeb
Channel3000	TTRWeekly	Citmagazine	Skift
City Press	Wall Street Journal	CNN	South China Morning
Citymetric		CNN Travel	Post
Daily News		Ctvnews	Stuff.co.nz
Economy next		Daily Mail	The Conversation
Express.co.uk		DailyHive	The Independent
Forbes		Deccanchronicle	The National
Fox News		Edinburgh News	The Telegraph
fvw Touristik &		ekathimerini	Tophotel.news
Business Travel		Eturbonews	Travel Daily Media
Get.com		EurekAlert	Travel Nine
HOTREC Hospitality		Forbes	Travel Pulse
Tourism Europe		Fox News	Travel Weekly
Independent		France24	Travel agent central
Iol.co.za		globetrender.com	Travelandleisure.com
Post Magazine		Hawai public radio	Traveller
Qr Code Press		Huffpost.com	travelmarketreport.com
Reuters.com		Inhabitat	Treehugger.com
Skift		Latestly.com	Watech.com
The Economist		Luxury Travel	10daily
The Guardian		Magazine	27east.com
The Telegraph		Macau Daily Times	
		New York Post	

Findings

Overtouristified destinations

Diverse overtouristified cities around the world are mentioned in the sampled news, suggesting the global relevance of tourist flows and the management of related impacts (Table 2). Not only cities but also areas with a reputation for the quality of their natural environment and fragility, as well as islands. Coherently with the relevance of tourism for Europe (51% of international tourist arrivals in the world, with a growth rate of 5% in 2018, UNWTO, 2019), many European cities are at the centre of the debate: Amsterdam (The Netherlands), Barcelona (Spain), Cornwall (UK), Dubrovnik (Croatia), Edinburgh (UK), Helsinki (Finland), Hvar (Croatia), Lisbon (Portugal), London (UK), Madrid (Spain), Valencia (Spain), Venice (Italy).

Table 2. *Overtouristified destinations from the online news media analysis*

Overtouristified destinations in the overtourism online narration	
Global	European
Boracay, Maya Bay (Thailand)	Amsterdam (The Netherlands)
Machu Picchu (Peru)	London (UK)
New York (USA)	Edinburgh (UK)
Kyoto (Japan)	Madrid (Spain)
Easter Island (Chile)	Valencia (Spain)
Seychelles	Dubrovnik (Croatia)
Tasmania (Australia)	Barcelona (Spain)
Colorado (USA)	Cinque Terre (Italy)
	Santorini (Greece)
	Venice (Italy)
	Lisbon (Portugal)
	Helsinki (Finland)
	Cornwall (UK)
	Hvar (Croatia)
	Bruges (Belgium)

Actions and tools to address and manage tourism flows and visitors' behaviours

The online news media analysis suggests a set of actions and tools discussed and/or adopted in diverse destinations willing to address and manage tourism flows and behaviours and pursue sustainability in the destination. Table 3 lists the actions and tools according to their underlying rationales (i.e., regulation, management, marketing).

The regulation approach includes the following tools: the introduction of tourist taxes (e.g., Barcelona, Lisbon), licensing and control of hospitality and commercial activities (e.g., Amsterdam, Madrid, Valencia, Kyoto and Barcelona); the prohibition of souvenir shops and new fast food outlets ("Nutella shops" in Amsterdam); and financial incentives to revive the commercial life of city centres (e.g., Lisbon). Regulative tools to mitigate or redirect tourist flows are: the restriction of the number of visitors in historical centres (e.g., Mallorca; Venice with metal barriers in the city centre; Dubrovnik, as part of the Respect the City programme, limited cruise tourist crowds); the limitation of short-term rentals (in Kyoto, short-term rentals are now only allowed in the low season).

The actions classified as management and marketing approaches confirm the importance of informing, persuading and changing tourists' and residents' behaviours to co-create destination sustainable development. Dispersal strategies (e.g., Helsinki), also through the use of smart ticketing and dynamic pricing (e.g., Amsterdam and London), were undertaken to reduce the pressure on certain areas towards less crowded parts of the destination. Educational programs for travellers (e.g., Colorado) were set by involving local stakeholders in tourists' flow management.

The role of smart technologies

Most of the actions listed in Table 3 are based on smart technologies or can exploit their power (e.g., data science software, social media platforms and real-time technologies). The smart technology tools support the management and marketing rationales for actions, for example through data collection and big data analysis (Gajdošík, 2019). Beyond the use of mobile apps to target travellers (e.g., Edinburgh) and the sophisticated use of social media to create preferences (e.g., Helsinki), mobile systems provide

opportunities to monitor and make evidence-based decisions, not only for medium/long-term planning and destination management, but also for real-time reactions to critical circumstances.

Table 3. *Actions and tools from the online news media analysis*

<i>Rationale of action</i>	<i>Actions</i>	<i>Tools</i>
<i>Regulation</i>	Compensation for tourists' impacts	Tourist tax
	Limiting the spread of hospitality business	Licensing and control
	Avoid tourism-related commercial conversion	Short-term rentals regulations
	Support commercial life of city centres	Prohibition of souvenir and new fast food shops
	Redirect tourist flows	Financial incentives
<i>Management</i>		Number of visitors' restrictions to access
	Development of new travel products for boosting dispersal	Public-Private Partnerships at regional/national level
	Planning mitigation actions	Forecasting techniques
	Stakeholder engagement and promotion of tourists' education	Travelling mobile tracking systems
	Integrated destination management (mobility, housing, public space management...)	Creative, committed knowledgeable intermediaries
<i>Marketing</i>		ICT platforms
	Targeting specific segments of the tourism market	Travellers' mobile tracking systems to analyse behaviours and big data analysis for targeting
	Managing access	Smart ticketing/dynamic pricing (discounts)
	Marketing the brand of responsible tourism/de-marketing	Critical use of social media to share "different" expectations and diversify the destination experiences
	Engaging with city visitors	Mobile gaming app

Table 4 considers both smart tech-based actions and traditional actions, respectively related to regulation, management and marketing. Even in the cases of traditional actions, where the reference to smart technologies is not explicit, applicative opportunities for smart technology-enhanced actions are relevant. Their applicative potential is evident for the integrated and 'networked destination' (e.g., creative intermediaries, regional and national partnerships and integrated management of urban space and services), also supporting decision-making of a variety of stakeholders that need to interact and exchange information and knowledge.

Significant awareness of the role of smart technology tools in destination management and marketing emerged from the analysis. Smart tech-based actions are narrated as: a) dispersing tourist flows and shaping tourists' behaviours; b) intrinsic to planning, managing and marketing the destination; c) integrating tourism in a broader vision of development; and d) engaging with visitors. On the other side, destination managers seem not to adopt specific smart tools when developing regulatory actions. Considering the traditional actions, there seem to be significant unexploited opportunity to capitalise on the power of the smart technologies. Smart tech for limiting access can, for instance, contribute to real-time redirection of tourist flows, or support the definition and respect of limitations against the uncontrolled spread of hospitality business and non-professional short-term rentals.

Table 4. *Smart tech-based and traditional actions*

<i>Rationale of actions</i>	<i>Smart tech-based actions</i>	<i>Traditional actions</i>
Regulation		Compensation for tourists' impacts Limiting the spread of hospitality business Avoid tourism-related commercial conversion Support commercial life of city centres Redirect tourist flows
Management	Planning mitigation actions (Forecasting techniques; Travelling mobile tracking systems) Integrated destination management (mobility, housing, public space management...) through ICT platforms	Development of new travel products Stakeholder engagement and promotion of tourists' education
Marketing	Targeting specific segments of the tourism market (Travellers' mobile tracking systems to analyse behaviours and big data analysis for targeting) Managing access (Smart ticketing/dynamic pricing- discounts) Marketing the brand of responsible tourism/de-marketing (Critical use of social media to share "different" expectations and diversify the destination experiences) Engaging with city visitors (Mobile gaming app)	

Discussion

A variety of smart technology tools emerged from the analysis, being envisioned under a regulatory, management and marketing rationales of action. Smart tools play a transversal role across the different approaches to action and show the potential to provide solutions that enable analysing, monitoring, tracking and addressing visitors' flows (e.g., mobile gaming to disperse visitors and create new itineraries), shaping attitudes, preferences and behaviours (e.g., big data and social media), and supporting destination decision-making and planning, by facilitating the convergence between top-down and bottom-up approaches.

The capacity of smart technologies to engage stakeholders and make them participate in bottom-up processes of destination co-creation, discussed in literature (Baggio & Del Chiappa, 2013; Del Chiappa & Baggio, 2015; Trunfio & Della Lucia, 2019), is made evident by the management and marketing actions and the related tools emerged in this research, but it may also play significant role in regulation, especially in relation to decision-making and destination planning. Decision-support systems, simulations, geo-localisation systems for tourist tracking (Ali & Frew, 2014), real-time technologies for monitoring and assessing impacts (UNWTO, 2018) may support the planning of incentives, taxes and limits to access to spaces, resources and assets, while enabling a control over licensed activities and rules application (Pasquinelli & Trunfio, 2020b).

Accordingly, based on the tools yet going beyond them, actions need to be interpreted in light of the embraced approach to tourism development, in order to effectively deal with the tourism impacts (factual, behavioural and perceptual) and in order to forecast and, then, assess the related outcomes in terms of local tourism sustainability. For this reason, the smart tools emerged in relation to smart

technology-based and traditional actions which, as said, can be interpreted as potentially turning into smart technology-enhanced actions, are summarized in the *Smart Technology Matrix* (Table 5). This is built on two out of the four Smart-City Lens dichotomies (Pasquinelli & Trunfio, 2020a): the mono-dimensional *versus* integrated logic of intervention and the top-down *versus* bottom-up approach. Both dichotomies concern the degree of inclusivity of governance processes, which represent the cornerstones for reducing the barriers towards the STD (Garcia-Hernandez *et al.*, 2019; Ivars-Baidal *et al.*, 2019).

The first dichotomy identifies the mono-dimensional logic, which refers to those smart tools utilised for engaging tourists and tourism stakeholders (e.g., tourism organisations) and, on the opposite, those tools addressing the whole system of stakeholders, such as local community, tourists, workers, entrepreneurs indirectly involved in the tourism sector in a more integrative way. In line with the literature, those tools adopted according to an integrated logic of intervention fit with the smart tourism destination and smart sustainable city framework, which combine technology, people and institutions to create public value in the city context (Desdemoustier, Crutzen, Cools & Teller, 2019).

The second dichotomy includes the top-down perspective, according to which smart tools are envisioned as supporting centralised destination decision-making and planning. On the opposite, the bottom-up perspective identifies grassroots actions involving a wide range of stakeholders responsibly addressing and managing the tourism impacts. Stakeholders may belong to the tourism market (second column of the matrix, e.g. tourists) and to the wider local community (third column, e.g. residents, retailers, property owners, etc.).

Table 5. *The Smart Technology Matrix*

	Mono-dimensional logic of intervention	Integrated logic of intervention
Top-down	<i>Smart tech</i> for licencing and control on hospitality <i>Smart tech</i> for limiting access Forecasting techniques Travellers' mobile tracking systems to analyse behaviours and big data analysis for targeting <i>Smart tech</i> for Public-Private Partnerships at regional/national level (new travel product development)	<i>Smart tech</i> for tourist tax collection and monitoring, e.g. Airbnb agreements <i>Smart tech</i> for licensing commercial activities <i>Smart tech</i> for incentive programmes to revive the commercial life of city districts <i>Smart tech</i> for defining short-term rentals regulations <i>ICT platforms</i> for integrated destination management (mobility, housing, public space management...)
Bottom-up	Critical use of social media to share "different" expectations and diversify the destination experiences <i>Smart tech</i> for creative, committed knowledgeable intermediaries	Smart ticketing/dynamic pricing- discounts Mobile gaming apps engaging city visitors

This classification emerged from the analysis suggesting a twofold understanding of smart technology tools. On the one hand, smart technology tools are envisioned as facilitating the driver role of local governments with a fairly positivistic/deterministic understanding of how to manage tourism flows and their impacts on the destination: smart technologies support decision-making as providing information and data, and enable the opportunity to control how the system sticks to rules.

On the other hand, the classification makes the bottom-up approach to smart technology deployment emerge, which is based on the propensity of different stakeholders to engage with more responsible behaviours, grounded on information collection and processing, education and a flexible attitude to

responding to contingent needs and contextual characteristics of the destination (e.g., smart ticketing, social media and mobile gaming).

Conclusion and further research paths

This exploratory paper contributed to the current debate on tourism crisis. It moved from the emerging opportunity to capitalize on the consolidated literature about smart tourism destinations and to cross-fertilise it with the recent academic debate on overtourism. This research effort introduced fresh knowledge to interpret the COVID-19 challenges faced by smart tourism destinations, suggesting the role of smart technologies in re-launching tourism in the post COVID-19 crisis.

In terms of theoretical contribution, the paper confirmed the relevance of overtourism and smart tourism destination literature domains to frame the emerging debate on destination management crisis. By capitalising on the discussion of smart technology tools that were put in place to address and manage tourism flows and visitors' behaviours in overcrowded destinations, the paper revealed the value of overtourism research advances in the COVID-19 time.

The smart tourism destination remains an extremely current and transversal theoretical framework, embracing consolidated and emerging streams of research, including the post-pandemic tourism crisis. The multiple roles of smart technologies and their transversal presence suggest that, beyond the single smart tools (Ivars-Baidal *et al.*, 2019; Garcia-Hernandez *et al.*, 2019), the smart tourism destination (Boes, Buhalis & Inversini, 2015; Buhalis, 1998; Buhalis & Amaranggana, 2014; Del Chiappa & Baggio, 2015; Gretzel, Yuan, & Fesenmaier, 2000; Gretzel, Sigala, Xiang & Koo, 2015) remains a valid conceptual framework to interpret destinations' response to crisis and to define new development trajectories.

The resulting theoretical framework, at the crossroad between overtourism and smart tourism destination agendas, contributes to framing tourism destination evolution in the post-COVID-19 time. When conditions of travel restrictions and the need for tourists' number quota highlight elements of discontinuities with the pre-Covid-19 overtourism contexts, evident continuities between the pre-Covid-19 and current global tourism scenarios emerge.

Different scenarios, however, characterize in concrete different destinations around the world, which deal with different conditions to respond to crisis and to adopt a smart tourism destination approach. Drivers of innovations – including destination actors, ICTs and social capital (Trunfio & Campana, 2019) – represent contextual conditions playing a crucial role in drawing change and pointing the destination towards preserving (path-dependence) or, instead, towards innovating (path-creation) the tourism development model. This means that responding to crisis by innovating implies not only the adoption of smart tools but also a more complex evolution of the social capital influencing behavioural and cultural change. The pandemic crisis might act as an accelerator, contributing to break strong cultural barriers and boosting behavioural change, but it might also turn being a trigger for involutinal dynamics.

Following this explorative research, future research paths can fruitfully address the following issues. Based on the four quadrants of the Smart Technology Matrix, a first research stream should deepen knowledge on the post Covid-19 evolutions in those destinations where top-down governmental policies and actions, responding to the mono-dimensional logic of intervention (focus on tourism sector), take place. A research hypothesis, grounded in the overtourism literature, would suggest the importance to test the prevalence of actions aimed at containing and mitigating temporal and spatial concentration of

visitors in the destination. In the frame of a path dependence, the consolidated tourism destination model is replicated, while addressing the most visible COVID-19 effects.

Empirical research should further analyse the extent to which local government's action is effectively empowered by smart technologies which help limit and control the tourism burden and rapidly react in "real time" to an increasing health threat. Tracking tourists, controlling access to tourist sites, in particular, may represent a precondition for guaranteeing physical distancing and provide a sense of health security to both visitors and the local community.

The second research stream concerns the destinations where top-down government policies lever on smart technologies to enhance the integrated logic of intervention, thus connecting tourism with other sectors and local realities. A research hypothesis is worthy of special attention. Paradoxically, these tools found several barriers in pre-pandemic crisis and it would be relevant to investigate whether (or not) and the extent to which the post Covid-19 context might represent a turning point. There is, in fact, the objective need to widely involve all stakeholders in order to maintain the health threat under control. Not just tourists' behaviours but the behaviours of all individuals in the local community – temporarily or permanently (residents, retailers, workers/commuters, etc.) – matter to reduce the health hazard. This scenario underlines a path dependence, in continuity with the consolidated top-down governance models, although adopting a broader approach to managing flows and behaviours of the diverse stakeholders.

The third research stream concerns the mono-dimensional logic of intervention combined with bottom-up approaches in the post Covid-19 time. A research hypothesis in this case can investigate the capacity of smart technologies to support destinations in designing and promoting new itineraries and innovative ways to experience and visit a certain destination. This research effort may be particularly meaningful in the destinations that gained a reputation of overtouristified cities or regions in the pre-Covid: in these cases, smart technologies may provide an opportunity to build a different image and create new preferences and expectations in future responsible travellers. Involving tourism stakeholders through bottom-up processes, smart tools may shape attitudes and behaviours moving towards path-creation scenarios.

The fourth research stream, where smart technology tools represent the support for a bottom-up and integrated perspective, reflects on new forms of community engagement in local development and new forms of tourism governance in the post COVID-19 time. Mobile gaming, for example, might support physical distancing but might also facilitate forms of social gathering in the virtual space where the value of meeting local community and making experience of the local culture can be pursued. Research should also deepen knowledge into the capacity of smart technology tools to facilitate constant and continuous engagement in the pursuit of the tolerable tourism impacts for local communities.

Considering this forth scenario as interpreting tourism regrowth in global socio-economic crisis, the transition towards new *smart tourism models* that prevent future overcrowding phenomenon and pursue *health, wellbeing and quality of life* leaves room to a renewed smart tourism destination agenda. Continuity emerged with recent research introducing the conceptual framework of tourism transformation and discussing the value in the context of the destination's liminality, cultural shock and challenges (Pung, Gnoth & Del Chiappa, 2020). Future research should focus on smart tourism development and resilience in the COVID-19 crisis to analyse the nature of transformative processes, by paying attention to the integration of values and knowledge, attitude and behavioural change which may drive sustainable tourism de-growth.

The resulting insights point towards some preliminary managerial and policy implications, which can reorient tourism development through appropriate policies and strategies. In the aftermath of the pandemic, such implications may prevent destination managers and policymakers from replicating the mass tourism development model and overtourism, also by relying on smart technology practices and tools, as discussed in this research.

The main challenge for policymakers is to exploit the 'forced' opportunity provided by the current crisis to rethink of tourism models and construct sustainable development trajectories in which not the high number of tourists but the socio-economic value created by a constrained flow of incoming visitors is pursued. Smart technologies, if integrated into a broader local approach to tourism development, may help face such challenge. Health and sanitary security for tourists and for the hosting communities, as well as a balance in the physical occupation of public space and cultural and leisure facilities is a priority, necessarily putting at the centre of the stage the quality of life and wellbeing in the tourism discourse. For the first time, these necessarily represent a priority for policymakers and tourism stakeholders, right next to the economic results and income.

Diverse scenarios should be considered by policymakers and destination management organisations to address tourism flows and behaviours, such as: planning, management and mediation of access to space, resources and assets (e.g., programs reviving historical shops, limiting tourists and hotel numbers, ruling the opening and conversion of commercial activities); dispersal, diversification and promotion of alternative itineraries that, while reducing the pressure on hotspots, create opportunities to innovate the tourist experience; and, finally, education creating the basis for responsible and responsive tourists keen to a deeper understanding of local community's heritage and current needs.

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